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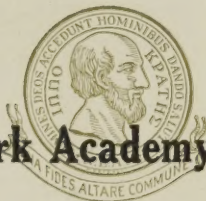
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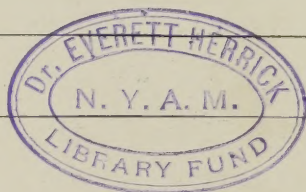
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By AMY ELIZABETH POPE

ESSENTIALS OF DIETETICS

A QUIZ BOOK FOR NURSES

ANATOMY AND PHYSIOLOGY FOR NURSES

MEDICAL DICTIONARY FOR NURSES

(WITH ANNA CAROLINE MAXWELL)

PRACTICAL NURSING

PHYSICS AND CHEMISTRY

A Quiz Book of Nursing

For Teachers and Students

By

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By Bertrand E. Taylor, A.A.I.A.

and

Hospital Book-keeping and Statistics

By Frederic B. Morlok

Chief Clerk in the Presbyterian Hospital, New York City

With Diagrams

Second Edition, Revised and Enlarged

G. P. Putnam's Sons

New York and London

The Knickerbocker Press

1915

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Fifteenth Printing



The Knickerbocker Press, New York

PREFACE

THIS book aims to be useful, in the most practical way, to nurses who teach, and to those who are studying under them. It is, in large part, a quiz book, offering in the form of terse question and answer essential information on a wide range of subjects—the information that is essential from the nurse's standpoint. Those who teach will find these questions of assistance when the time they have to devote to preparation for their class work is limited; and those who are taking courses will find the book a great help, especially when studying for examinations. There are some one thousand questions on nursing subjects proper, including the general care of the ward; the usual daily care of patients; the significance of the more common symptoms and the special points pertaining to them to be noted and recorded; methods of administering medicines; the principles of surgical nursing, of obstetrics, of the care of children, of first aid in emergencies, the duties of head nurses, and of private nurses; and the methods of teaching nursing. There are about fifty question on hygiene, the same on bacteriology, three hundred and fifty on anatomy and physiology, two hundred and fifty on dietetics, and one hundred and fifty on materia medica.

In addition to the comprehensive series of quizzes, there are chapters on District Nursing, Hospital Construction, and Hospital Accounting. District Nursing is, of course, an important subject; the chapter treating of it here is written by Miss Margaret Bewley,

Supervising Nurse of the District Nursing Department of the Presbyterian Hospital, New York City. The two other chapters just mentioned—that on Hospital Construction by Mr. Bertrand E. Taylor of the firm of Kendall, Taylor, and Company, experienced builders of hospitals; and that on Hospital Accounting by Mr. Frederick B. Morlok, Chief Clerk of the Presbyterian Hospital—are concerned with subjects not generally treated in schools of nursing, and should be exceedingly useful and suggestive to nurses.

In conclusion, the authors wish to acknowledge particular indebtedness to the following books: *A Manual of the Practice of Medicine* (Stevens), *Disinfection and Disinfectants* (Rosenau), *Primary Nursing Technique* (McIsaac), *Hygiene for Nurses* (McIsaac) *Nursing, its Principles and Practice* (Robb), *Materia Medica for Nurses* (Dock), *Materia Medica for Nurses* (Paul), *Hospital Training School Methods and the Head Nurse* (Aikens), *Anatomy and Physiology for Nurses* (Kimber) *Essentials of Dietetics* (Carpenter and Pope), *Practical Nursing* (Maxwell and Pope). They wish also to thank the many friends who have kindly helped them.

In writing this book, the authors consulted all the principal text-books and many of the reference books which schools of nursing have found most helpful, and endeavored to combine in it, as far as they could, the good features of preceding works, so that, it is believed, the present volume will meet a need irrespective of the text-book which happens to be in use.

A. E. P.

T. A. P.

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A Quiz Book of Nursing

Quiz Book of Nursing

CHAPTER I

THE WARD

Care of the Ward. Its Furnishings, Utensils, and Linen.
Care of Patients' Clothes.

(a) *Why is careful dusting of primary importance in a hospital ward?* (b) *How should it be done?*

(a) Because there are always a large number of germs present and if dust is allowed to collect they will settle in it and, should they find sustenance, multiply.¹

(b) The dusting should be done with a damp duster. While dusting, a basin of water should be at hand in which to frequently moisten and cleanse the duster. As far as possible, dust should be removed from a surface with a single, firm stroke, and not by passing and repassing the duster over the same ground. Particular attention must be paid to all bars, crevices, corners, and high ledges.

(a) *Mention something in the ward which must not be dusted with a damp duster.* (b) *Why?*

(a) The electric light fixtures. (b) If the moisture enters any crevices and penetrates to the wires, it may put them out of order.

With what should the floors of a hospital ward be swept?

With a soft brush covered with a damp duster. The duster must be changed as soon as soiled.

¹ See page 205.

Why is a damp duster used for dusting and sweeping?

To prevent scattering the dust.

Mention some methods of removing stains from colored wood.

Rub the stain with (1) tincture of camphor; (2) equal parts oil and alcohol; (3) equal parts oil and turpentine. If the wood is polished use the last.

What should be done if alcohol is spilled on varnished or painted wood?

Oil should be poured over the alcohol before attempting to remove the latter. If a spot remains after removing the oil and alcohol, it should be rubbed well with oil.

How are grease stains removed from unvarnished wood?

By scrubbing them with solutions of soda, potash, or ammonia.

How can ink stains be removed from wood?

By covering the ink spots, while wet, with some absorbent substance—such as flour, starch, shredded blotting paper. After a few minutes, remove the application and apply another, and continue to do this until the absorbent no longer becomes stained; then, rub the spots with lemon juice and salt until they disappear, and if white marks result, rub them with oil and turpentine.

Mention a method of removing stains from porcelain.

Rubbing with benzine or iodine, followed by washing in soap-suds and warm water, or ammonia in water.

How can many kinds of stain and rust be removed from iron or steel?

By washing the metal with sweet oil and, while still wet, covering it with powdered quicklime. Super-

ficial rust can be usually removed by rubbing the rusted metal with kerosene or oil.

What should be done if any acid is spilt on marble?

It should be washed off immediately with soda or ammonia water.

How can oil or other grease stains be removed from marble?

By washing the stained part with a hot solution of soda water and covering with a paste made of fuller's earth. Leave this paste on for twenty-four hours and, if the stain has not then disappeared, renew the application.

What measures should be taken to prevent grease collecting in sinks?

Pipes of sinks in which greasy dishes are washed should be flushed twice weekly with hot soda solution.

What care should be taken to prevent the presence of odors and to insure the cleanliness of hoppers and toilets?

They should be always well flushed after use and, at least twice a day, a disinfectant and deodorant should be poured into the drain.

What care should bed-pans and like utensils be given in order to guard against odor and insure perfect cleanliness?

They should be always thoroughly cleansed after use and, whenever necessary, unless there is a utensil sterilizer, a deodorant such as formaldehyde—which is both deodorant and disinfectant—put in. They should, in such case, also, be scrubbed daily with hot soap and water and allowed to stand in a disinfectant for at least half an hour. When there is a utensil sterilizer, they are sterilized instead of being disinfected. A deodorant should be used if necessary.

When the sterilizer and hopper are combined, utensils and excreta can be sterilized at the same time.

What care must be taken of mattresses and pillows in order to keep them clean and free from germs and bedbugs?

After the discharge of a patient they must be whisked thoroughly, the whisk being wet in a disinfectant. When a patient remains in the hospital a long time this must be done once a month. After the discharge or death of a patient who has had an infectious disease or a septic wound, they should be baked. When a patient is well enough to get out of bed, the mattress must be aired, daily, for at least twenty minutes.

What care must be taken of blankets in order to prevent their becoming soiled, and to preserve them?

The sheet must be always folded over them at the top, they must never be allowed to drag on the floor when removing them from the bed, etc. New blankets must not be put on the beds of very sick patients, nor of those suffering from an infectious disease, nor on a bed prepared for an ether patient, nor must they ever be used for giving baths, etc., unless specially provided for that purpose.

What must be done to the ward linen, if it is to be kept free from stains?

All stains must be removed before the linen is sent to the laundry. This can be often done by simply washing it in cold or slightly warm water, if the washing is done while the staining agent is still wet.

How can bichloride stains be removed?

By soaking the article in chlorinated soda (Labbarraque's solution), one quarter $\%$, for twelve hours,

and then washing it well in hot water, to remove the soda, as, otherwise, the soda will destroy the cloth.

How can blood stains be removed?

They can be generally removed by washing with soap and tepid water, when not, by applying hydrogen peroxid.

How can coffee, tea, and fruit stains be removed?

Frequent soaking in boiling water is generally sufficient. When this does not answer, the spot should be spread over a bowl of boiling water and rubbed with a saturated solution of oxalic acid. Afterward it must be rinsed in ammonia water, and then in clear water, in order to remove all the oxalic acid.

Mention some methods of removing ink stains.

Stylographic and red ink stains can generally be removed by washing with soap and tepid water; other inks by washing with milk, or with lemon juice and salt, or turpentine—turpentine can be used on colored material. When these fail, oxalic acid can be used. It is applied in the same manner as for coffee stains.

How should you remove iodine stains?

First wash with alcohol and then rinse with tepid water, or wash with ammonia and water.

How can rust stains be removed?

Spread the stained part over a bowl of boiling water, rub it with common salt wet with lemon-juice, and then place it in the direct rays of the sun. Repeat the process until the stain becomes light yellow, then wash the cloth in weak ammonia water and afterward in clear water.

How can vaseline stains be removed?

By washing with ether or benzine.

Mention some points to remember regarding the care of the clothes of patients admitted to the hospital.

To remove all valuables from the pockets, and to follow the hospital rules regarding their disposal to the letter; to remove all matches from the pockets; to most carefully examine all seams and gathers for lice; to fold or hang the clothes in such manner that they will not become crushed or otherwise damaged, and to tag them carefully with the owner's name; to write the number of the cupboard in which the clothes are placed in the book in which they are listed, also the name of the person who listed them. Lack of care in the disposal of soiled clothing, especially that infested with lice, is generally followed by serious consequences.

CHAPTER II

GENERAL CARE OF PATIENTS

Care of the Mouth, Skin, Hair. Methods of Making Patients Comfortable. Restraining Patients.

CARE OF THE MOUTH.—*How often should the mouth of a patient running a high temperature be washed?*

After every feeding and, if an infectious disease is the cause of the temperature, before, as well as after.

What is sordes?

A mixture of dried epithelium, food, and germs, which is apt to collect in the mouth during illness, especially when the temperature remains continuously high.

What may be the consequence, if this is not removed?

Ulceration of the mouth and tongue, otitis media, increased tympanites, reinfection of the patient.

What is required in addition to cleansing the mouth? Why?

It must be kept moist with a lubricant, in order to avoid the drying and cracking of the mucous membrane and consequent increase of danger of inflammation and ulceration.

What material should, and what should not, be used to cleanse an infant's mouth?

Absorbent cotton or some equally soft material should be used, gauze or any rough substance should never be used.

What may be the result of lack of care of an infant's mouth?

Local disease of the mouth, gastric or intestinal indigestion, and, if the baby is nursing, infection of the mother's nipples.

Points to be emphasized by instructor:

The rapidity with which lack of care will show.
The necessity for care at night.

CARE OF THE SKIN.—*What care should be given a patient's skin?*

If possible, the whole body should be bathed every day, if this is not possible, it should be done twice a week, at least. Those parts of the body where the perspiration is most profuse, as the axilla and pubes, should be washed daily. Those parts where bed-sores are likely to form, as the lower part of the spine, the shoulders, heels, and elbows, should be washed twice a day with warm water and soap, rubbed with alcohol, and massaged. If bed-sores seem imminent, this treatment must be repeated about every four hours.

Why are baths so important in illness?

(1) In illness, the circulation of blood in the skin and the action of the skin glands are likely to be sluggish, and bathing helps to rectify this and thus to keep the skin in good condition and prevent bed-sores. (2) A bath causes a feeling of comfort and is likely to have a soothing effect upon a patient. (3) Baths prevent odor due to decomposing skin excretions.

About how much perspiration is excreted normally, in the twenty-four hours?

Two pints.

What are the points to remember in giving a bed-patient a bath?

To be sure that the room is sufficiently warm; that

there are no draughts; that everything required for the bath is at hand; never to expose the patient, but, if necessary, to raise the blanket slightly from time to time in order to see that the skin is clean, and to notice if any abnormalities are present; to wash the body in sections beginning at the face, and to dry each part thoroughly before going on to the next; to wash and dry particularly carefully the axilla, the pubic region, and between the fingers and toes.

If told to give a tepid bath what temperature would you have the water?

Between 85° and 92° F.

What temperature would you make a baby's first bath?
Between 95° and 100° F.

What temperature should a bath be for a child one year old?

Between 85° and 90° F.

PRESSURE SORES.—*What are pressure sores?*

Gangrene or death of the tissue.

What are the predisposing causes?

Lowered vitality, extreme emaciation, general edema.

What are the immediate causes?

Moisture, crumbs in the bed, wrinkles in the sheet or nightgown, a too long continuance in one position, badly adjusted splints.

What preventative measures, other than removing all predisposing causes, should be taken?

The threatened parts should be washed with soap and hot water about three times a day, also they should be massaged, rubbed with alcohol, and powdered. All pressure should be relieved.

Explain the action of the treatment.

The soap and hot water prevents the clogging of the

sweat and oil glands, the massage improves the local circulation, the alcohol dries and hardens the skin, and the powder dries the skin.

Points to be emphasized by instructor:

The rapidity with which bed-sores will form under certain conditions.

How difficult they are to heal.

That they retard recovery.

Necessity to be on the watch when splints and other orthopedic appliances are used.

CARE OF THE HAIR. *How would you comb a woman patient's hair?*

Put a towel under her head; part the hair in the centre, begin to brush or comb at the ends, hold the hair firmly between tangle and the head; if there are many tangles rub a little vaseline into the hair; plait it in two braids, making the plaits just back of the ear so that patient will not lie on them.

How can you distinguish between dandruff and the nits of pediculi?

Dandruff will brush off easily, nits cling tenaciously to the sides of the hair.

What will you do if you find pediculi?

Put a rubber under the head; wash scalp and hair with tr. of delphine or carbolic 1 to 40; bind a towel around the head and let it remain one hour; comb the head with a fine tooth comb, wash with soap and hot water; if there are nits, wash with hot vinegar. When the hair is dry, rub delphine or carbolic into the scalp and hair; braid the hair and fold a towel around it. Apply delphine or carbolic every day until there are no signs of pediculi.

Enumerate the articles required for washing the hair of a bed patient and describe the process.

2 rubbers, 2 towels, a pitcher of soap solution, a large pitcher of warm water, a pail or foot-tub.

Draw the patient over to one side of the bed, cover the pillow with a rubber and that with a towel and second rubber; pin one side of the top rubber around the neck and put the free end in the pail, which place on a low table or chair at the side of the bed; roll the sides of the rubber to form a trough. In washing, pour slowly, first the soap solution and then the water, over the head, rubbing the scalp and hair well at the same time. When the soap has been thoroughly washed from the hair, remove the top rubber and dry the hair with the towel covering the under rubber, and by fanning. When as dry as possible, exchange the wet towel for a dry one and spread the hair out on this that it may dry.

Points to be emphasized by instructor:

The necessity of examining the heads of all new patients carefully, and to do it without the knowledge of the patient in order not to give offence.

The rapidity with which other patients will become infected.

The need of watching one's own head, and of taking self-protective measures while, and after, caring for a head containing pediculi.

That the hair can often be prevented from falling, after even a severe illness, if properly cared for during that time; *i.e.*, by being kept clean and the use of tonics and massage.

METHODS OF MAKING PATIENTS COMFORTABLE.—
Mention some things you can do on a hot day to make a patient comfortable.

Rub the body with alcohol, pull the *draw-sheet* partially through, so that the patient will lie on a cool part, fan the patient and bed with the top covers and with a fan.

What can you do for patients whom it is necessary to keep in the dorsal position when they complain of pain in the back due to the position?

Knead the muscles of the back *frequently*; rub the back with alcohol; put small pillows, water-bags filled with cool water, or small pads in the hollow of the back.

How can you relieve strain on the abdominal muscles?

By putting a folded or a triangular pillow under the knees.

Mention some things that should be remembered when setting a patient up in bed for the first time after a severe illness.

To feel the pulse before and after setting him up; to arrange the pillows in such manner that they will support every part of the back—especially in the hollow—the head, and the arms; to tie a pillow or board at the patient's feet or else provide other means to prevent his slipping down in bed; unless the weather is very warm, to put a small wrap about the shoulders; not to let him sit up too long; to feel the pulse after he lies down. If the patient feels weak while sitting up, it is well to give him a little beef-tea or broth.

Mention some things that a nurse can do to induce sleep when a patient is wakeful.

Be sure that the patient is, in every way, as com-

fortable as circumstances permit; give massage, especially deep kneading of the muscles of the back; if the weather is not too warm, place a hot water-bag at the feet; give a hot drink.

Why will these devices induce sleep?

They draw the blood from the brain, and anemia of the brain is conducive to sleep.

Mention two important things for a night nurse to remember. Give reasons.

(1) That it is necessary to feel the pulse of sick patients frequently during the night as sudden changes for the worse are very apt to occur. (2) As soon as the air gets colder, to give blankets, not only to those who ask for them, but to all whose condition makes extra warmth advisable; vitality is lower at night than by day, therefore it is imperative that those whose natural vitality is low should be provided with extra external heat.

Mention some things which, if a nurse fails to observe or do, may cause patients annoyance.

A draught, a light shining in their eyes, annoying noises, as rattling windows, whispering, etc.; being kept waiting for things they have asked for.

RESTRAINING PATIENTS.—*Mention some important points to remember in the restraint of patients.*

Patients must only be restrained when absolutely necessary, and then, only as much as necessary, but restraint must be effectual. Care must be taken not to abraid the skin, not to impede the circulation, not to interfere with the respiration, and, especially when the patient has any abdominal disease, not to make pressure on the abdomen.

Demonstrate how you would restrain a very delirious patient if you had no camisole.

Points to be emphasized by the instructor :

That when patients are inclined to be delirious, restraint will often irritate them and so cause delirium.

That delirium, by making the patient restless, will increase the strain on the heart, and thus lessen his chance of recovery.

The symptoms of delirium-tremens, and the rapidity with which the condition sometimes develops.

How patients have sometimes been injured and escaped from the ward because restraint was ineffectual.

That when the patient is very restless even restraint that is perfectly applied can become either tightened or loosened; and that, therefore, *all delirious patients must be constantly watched.*

CHAPTER III

SYMPTOMS

Their Significance—Points to be Noted and Reported.

What is the difference between subjective and objective symptoms?

Objective symptoms are those observed by the onlooker; subjective, those complained of by the patient.

Give one reason why it is very important that nurses should know the significance of symptoms, and those likely to occur in the course of the various diseases.

Symptoms are not always very obvious or very pronounced, and, unless a nurse is on the watch for them, they may escape her notice.

Give some reasons why quick and accurate observations of symptoms is so important.

Unless the first symptoms of an adverse change in a patient's condition are observed, he may become so much worse that it will be impossible to save his life. Unless symptoms of overdosing are recognized, patients will be poisoned. By observing and reporting intelligently symptoms occurring in the course of disease and those following the use of drugs, nurses can often assist the doctor in forming a diagnosis, in deciding how best to treat the patient, and in forming an opinion as to the value of the medicines used.

Mention some conditions of the eyes that indicate mental disturbance.

A fixed, staring gaze; a shifty, restless movement; a wild, excited look.

Mention some causes of contraction and dilatation of the pupils.

Contraction is a symptom of overdosing by certain drugs, and of pressure on the brain. Dilatation also is a symptom of overdosing by some drugs, and, especially when it is uneven in the two pupils, of pressure on the brain.

What are lachrymation, photophobia, and strabismus, and to what may they be due when occurring in the course of disease?

Lachrymation is a running of tears from the eyes; it is often one of the first symptoms of measles. Photophobia is a sensitiveness to light; it is present in some diseases of the brain. Strabismus is a lack of power to direct both eyes toward the same point; occurring in the course of disease or after an accident, it may indicate pressure on the brain.

What may puffiness under the eyes indicate?

Kidney complications, arsenical poisoning, anemia.

To what may deafness be due?

Medicine; injury or disease of the ear, or of that part of the brain in which the nerve centres which govern the sense of hearing are seated.

Describe abnormalities that are sometimes seen in the teeth, and state their probable causes.

Brittle and furrowed teeth, caused by rickets; Hutchinson's teeth, *i. e.*, small pegged teeth with crescentic notches on the central incisors, due to hereditary syphilis; laminated, or pitted, teeth, the result of an infectious disease in childhood.

Mention some abnormal conditions of the gums, and probable causes.

A blue line near the insertion of the teeth is indicative of chronic lead, copper, or silver poisoning; swelling

of the gums and salivation, of mercurial poisoning; spongy, bleeding gums, of scurvy.

Describe condition of the tongue known as "strawberry tongue" and state when it is present.

The papillæ of the tongue are bright red and swollen. It is seen in the first stages of scarlet fever.

Describe the throat symptoms of diphtheria.

The tonsils are covered with an ashy-gray membrane that is not easily detached, and which spreads in a short time to the pillars, uvula, and pharynx. Klebs-Löffler bacilli are found in the membrane.

In what other disease are the throat symptoms somewhat similar?

In tonsillitis.

Mention some differences between the two.

In tonsillitis, the membrane is of a yellowish color, it is easily detached, and, as a rule, remains confined to the tonsils; the Klebs-Löffler bacilli are absent. The last is often the only positive difference.

State some abnormalities that may sometimes be observed in the odor of the breath and their causes.

A fetid odor: this may be due to suppurative disease of the mouth or throat; caries of the teeth; certain diseases of the lungs, such as gangrene; dyspepsia; ingestion of certain foods and drinks. A sweet odor, usually due to diabetes. An odor of urine, which is a symptom of uremia.

What is aphonia, and to what may it be due?

Loss of voice. It may be due to hysteria, to inflammation, or paralysis of the vocal cords.

Describe coughs that are characteristic of certain diseases.

There is a short, sharp cough caused by nervousness; **a** deep, forcible cough, usually accompanied by profuse

expectoration, connected with bronchitis; a wheezing cough in asthma; a hacking, constant cough in phthisis; a shallow cough, accompanied by severe pain, in pneumonia; a peculiar crowing cough in croup; a convulsive cough followed by a whoop in whooping-cough; a breathless, distressed, constant cough is often present in heart disease.

What particulars should be noted about sputum?

Its odor, color, quantity, if tenacious, if it contains blood, pus, mucus, or other foreign matter.

What should be particularly noted in the sputum of pneumonia?

If the amount of blood increases or decreases, and if it becomes darker in color.

What is it called if it becomes dark? Why is this an adverse symptom?

Prune-juice sputum. It shows that there is an increased disintegration of the lung substance.

Mention peculiarities in children's cries that will help in discovering their cause.

The cry of hunger is usually fretful and the child sucks its finger while crying and, usually, ceases crying as soon as it is fed; the cry of indigestion is similar to the cry of hunger, but it does not cease after feeding; the cry of temper is loud and violent and usually accompanied by stiffening of the body or throwing about of the arms and legs; the cry of colic is usually continuous and loud and the child draws up its legs, and writhes, and twists its body; the cry of pain is sharp and accompanied by contortions of the features, and twisting of the body; a feeble whining cry is indicative of weakness and marasmus; there is a peculiar sharp, ringing cry that is characteristic of meningitis, hydrocephalus, and bone disease.

What is dysphagia? To what may it be due?

Difficult swallowing. Inflammation in the pharynx, obstruction in the esophagus, hysteria.

In what disease are dysphagia and regurgitation of the food to be constantly watched for?

Diphtheria, paralysis of the muscles of deglutition being one of the most common complications.

If a patient suffering from even a slight accident developed an over-alert, excited expression, what would you be on the watch for?

Delirium-tremens.

Why?

The shock of an accident will often precipitate an attack in those accustomed to the over-use of alcohol.

What change in the expression and color would lead you to suspect a hemorrhage?

A pinched, anxious expression, and pallor.

What does a yellow color of the skin denote?

Jaundice.

What is jaundice the result of?

Bile in the blood and tissues, due to obstruction of the bile ducts; or to toxemia.

Why is special vigilance necessary after operation if a patient is jaundiced?

There is more than the usual danger of hemorrhage, as the bile lessens the coagulable property of the blood.

What is jaundice in the new-born called?

Icterus neonatorum.

What conditions are severe cases a symptom of?

Syphilis, septic infection of the cord, constriction of the hepatic duct.

Of what are chills usually the result?

Of nervous irritation; the irritation may be the

result of some disorder of the nervous system, the toxic poisoning of disease, or cerebral pressure.

What particulars regarding a chill should be charted?

Its duration, intensity, and the effect on the temperature.

Of what are convulsions usually the result?

Of cerebral or nervous irritation.

What is the difference between tonic and clonic convulsions?

In tonic convulsions the muscles are contracted continuously, in clonic, they are contracted and relaxed alternately.

What are the most common causes of convulsions in children?

Worms, indigestion, undue excitement, fright, and the onset of disease.

What particulars of convulsions should be noted and recorded?

Whether they are general, or if only certain parts of the body are involved; if the eyes are affected and in what way; whether there is any frothing at the mouth; any change in the color, temperature, pulse, or respiration, if there is loss of consciousness.

What does cyanosis indicate?

Imperfect oxygenation of the blood.

In what cases is delirium apt to come on very suddenly?

After accidents, and in pneumonia, when the patient is alcoholic.

What symptoms denote the approach of delirium-tremens?

Restlessness, picking at the bedclothes, hallucinations.

What form of delirium is most common in typhoid?

A low muttering delirium, often associated with

certain hallucinations, in which the patient forgets his whereabouts and is constantly possessed with the desire to get out of bed.

When is perspiration a favorable symptom? When unfavorable? Why?

When there has been a continued high temperature, perspiration is often a favorable symptom, as it shows that the skin is resuming its normal function. When the skin is cold and the temperature high, it shows excessive weakness and is a very adverse symptom.

What particulars should be charted in regard to perspiration?

Its odor, duration, the hour of its appearance, whether slight or excessive, whether general or local.

What position is a patient likely to assume if suffering from abdominal pain?

Usually, if the pain is due to inflammation, he will lie on his back with his legs drawn up; if the pain is due to colic, he often lies on his abdomen.

What position is typical of meningitis?

The head retracted and the legs flexed.

What are the most common causes of rash?

Disease, indigestion, certain drugs, pediculi.

What particulars should be noted about a rash?

How soon after the initial symptoms it appears, where it first appears, the order in which it spreads, its general appearance, and if followed by desquamation.

Describe the rash of chicken-pox.

It appears within twenty-four hours, first, upon the face, scalp, and neck, later, upon the extremities and back. In some respects the rash resembles that of smallpox, but there are the following differences: The macule changes to a vesicle in a few hours, the

spots are never umbilicated, the fluid contained in the vesicles is thinner and unless infected rarely becomes pus, the crusts form by the fourth or fifth day and drop off in a few days.

Describe the rash of measles.

It appears about the fourth day, first on the roof of the mouth or chin, later, successively, on the forehead, sides of the throat, face, chest, and then on the lower part of the body. It consists of red elevated spots that tend to coalesce into crescent-shaped blotches but which do not become confluent as in scarlet fever. The eruption persists for from two to five days, disappears in the order of its appearance, is followed by a fine mealy desquamation that usually continues for a week or more.

Describe the rash of German measles.

It appears first behind the ears and around the mouth, then on the chest and the rest of the body. There are two forms of the eruption; one resembles that of scarlet fever, the other that of measles, except that it never becomes crescentic. It is sometimes followed by a slight desquamation.

Describe the rash of scarlet fever.

It appears within from eighteen to thirty-six hours, first on the neck, chest, and back; it then spreads rapidly over the face and body; it rarely involves the chin or around the mouth, but is often present in thick patches in the pharynx. It is usually of a bright red color, confluent in type. It disappears on pressure, a white line remaining for a second or two when the finger is drawn through it. The rash usually persists for from five to seven days and is followed by desquamation of the skin in large flakes.

Describe the rash of smallpox.

It appears about the third or fourth day, first on the forehead, face, and wrists; it then spreads rapidly over the entire body. First, there are small red spots which soon turn to small, round papules, that feel like shot under the skin: these in turn change to vesicles with a depression in their centre. In two or three days the fluid in the vesicles changes to pus. In about three days the pustules either dry up, or break and form crusts that adhere to the skin for a week or two.

What is subsultus?

An involuntary trembling of the body.

What does it indicate when it occurs in the course of a disease?

Excessive weakness.

What is tympanites?

Abdominal distention, due to an accumulation of gas in the stomach or intestine.

To what is this accumulation of gas generally due?

To excessive fermentation or putrefaction in the stomach or intestines. It is often the result of constipation, in consequence of which food remains exposed too long to the action of bacteria.

Why is tympanites often a serious complication?

The gas pushes the diaphragm against the heart and thus interferes with its action.

Of what is tympanites the result after an abdominal operation?

Defective peristaltic action.

Mention two methods of vomiting that, should they occur, must be noted and reported, and state their significance.

(1) Projectile vomiting; this is sometimes seen in peritonitis and certain diseases of the brain; (2) vom-

iting without nausea, the most common causes of which are uremia, brain disease, certain neuroses of the stomach, hysteria.

Mention some varieties of vomitus that indicate dangerous conditions and their significance.

Coffee-ground vomitus—this generally means hemorrhage into the stomach or peritonitis; dark brownish-green vomitus with an acid reaction, indicative of peritonitis; vomitus with fecal odor, generally the result of intestinal obstruction; vomitus containing blood and mucus, significant of gastric ulcer; frothy blood, indicates hemorrhage of the lungs; purulent vomitus, generally the result of the rupture of an abscess into the stomach.

How would you examine feces for worms or calculi?

Tie a piece of thin white muslin over a chamber, or other vessel, empty the feces on to this, pour water over it slowly and, at the same time, break all lumps with a stick.

Mention some abnormal appearances of stools and the probable causes of the condition.

(1) Blood in the stool; this may be due to many causes; among the more common are: ulcers in the intestine, as in typhoid; acute inflammation of the bowels, as in enteritis and dysentery; traumatism; hemorrhage into the intestine from the stomach, etc.; intussusception; piles; fistula. If the stools are black or the blood clotted in small masses and mixed with feces, it shows that the hemorrhage is in the upper part of the intestine, if the blood is bright red, that it is from the lower part of the bowel. (2) Black stools; these may be due to hemorrhage in, or into, the small intestine, or to certain drugs. (3) White curds in the stools show that milk has not been

properly digested, or, in the case of children, that there is either too much fat or too much protein in the milk—if the curds are soft the former is indicated, if hard, the latter. (4) Green stools may be due to the presence of an excessive amount of bile, the ingestion of certain medicines, or, in the case of children, to defective digestion or fermentation due to bacterial action. (5) Slimy or mucus stools are the result of catarrhal inflammation; when the mucus is mixed with the fecal matter it shows that the irritation is in the upper part of the intestine, if in flakes or masses, that the trouble is near the rectum. (6) Watery stools, when yellow, especially in children, indicate a depressed nervous condition; if colorless and profuse, with little fecal matter, the trouble is usually due to an infectious germ—this is the character of the stools in cholera infantum. (7) Fat in the stools; this may be the result of the ingestion of an excessive amount of fat, of the absence of bile, or disease of the pancreas. (8) The presence of pus; this may be the result of a fistula in ano or the rupture of an abscess in, or into, the intestine. (9) Lienteric stools—*i.e.*, those containing a large amount of undigested food—indicate irritation of the stomach or duodenum. (10) Hard lumpy stools result from constipation.

When nursing patients with any of these abnormal conditions of the stools, what must be remembered regarding observing and reporting them?

To notice and record any change, either for the better or worse; to make a daily note of existing conditions.

What particulars should be noticed in the condition of urine?

Its quantity, color, and odor.

What are the common causes of turbid urine?

The presence, in excess, of any of its normal constituents, of pus or bacteria; alkaline decomposition.

What may dark, smoky urine indicate?

An overdose of carbolic acid, iodoform, salol, or guaiacol; the presence of decomposed blood pigment.

What does a green color indicate?

The presence of bile, due to an obstruction in the gall-bladder or ducts, and consequent secretion of bile by the blood and elimination through the kidneys.

In a case of scarlet fever, what symptoms would suggest an acute attack of nephritis?

Pain in the lumbar region; nausea; vomiting; edema, beginning in the face; a moderate rise of fever.

What are the signs of internal hemorrhage?

The skin is cold, pale, and covered with perspiration; the pulse becomes rapid and feeble; the respirations shallow and sighing; the temperature falls; there is thirst; restlessness; a longing for fresh air; and vertigo.

What are the primary symptoms of intestinal perforation?

A sudden intense pain is the principal symptom; also there are an increase in the frequency of respiration, a rise of temperature followed by a fall; and there may be hiccoughing and vomiting.

Why are the symptoms of shock similar to those of hemorrhage?

Because, due to depression of the nervous system, the blood-vessels are unduly dilated; consequently, so much blood remains in the large internal vessels that the tissues are as much deprived of it as they are by hemorrhage.

CHAPTER IV

TEMPERATURE, PULSE, RESPIRATION

Temperature ¹

What are the sources of bodily heat?

Such chemical changes occurring in the body tissues as are associated with oxidation.

How is the heat disseminated through the body?

By the blood.

What are the principal ways in which the heat is eliminated?

By radiation of heat from the skin and mucous membrane of the air passages; by the evaporation of sweat from the surface of the body; also, small quantities are lost in the urine and feces and by respiration.

What force maintains the balance between heat production and heat elimination?

The nervous system. See page 265.

What are the principal causes of fever?

Fever may be due to increased heat production or decreased heat elimination. It is thought that interference with heat regulation is usually due to depression of heat-regulating centres in the brain by such substances as the toxins of bacteria, those produced by faulty metabolism or by injury to any of the tissues of the body.

What are the different stages of fever?

(1) Invasion, the period in which the temperature rises; (2) fastigium, the period in which, though there may be remissions, the temperature remains

¹ See Appendix, page 369.

high; (3) defervescence, the period during which the temperature gradually falls to normal.

How does fever terminate?

- (1) By crisis, the temperature falls suddenly.
(2) By lysis, the fall is gradual.

What are the common types of fever?

- (1) Continuous fever; the temperature remains continuously high with slight diurnal fluctuations.
(2) Remittent fever; the diurnal fluctuation is marked, but the minimum temperature remains above normal.
(3) Intermittent fever, the temperature rises to febrile height and falls to or below normal.

Of what type are pneumonia and scarlet fever?

Continuous fever.

Of what type is typhoid?

Remittent fever.

What are the common causes of a subnormal temperature?

Excessive vomiting, diarrhea, hemorrhage, shock, intermittent fever, certain drugs.

Mention conditions that will cause deviation of the temperature in health.

The temperature is raised by eating, excessive exercise, excitement, and constipation. It is lowered by increased perspiration. (See page 369.)

What degree of temperature is known as hyperpyrexia?

106 and over.

What degree of temperature is known as high fever?

103 to 106.

What degree of temperature is known as moderate fever?

101 to 103.

What degree of temperature is known as subfebrile?

99.5 to 101.

Temperature, Pulse, Respiration 29

What degree of temperature is known as normal?

98 to 99.

What degree of temperature is known as subnormal?

97 to 96.

What degree of temperature is known as collapse?

96 and below.

What particulars should be remembered when taking the temperature by mouth?

That it must not be taken within fifteen to twenty minutes after the patient has had anything to eat or drink; that while the thermometer is in the mouth, it is necessary to be sure that the patient keeps it under his tongue and keeps his mouth tightly closed; that the thermometer must remain in the mouth long enough to register, but not one minute longer.

What must be remembered when taking the temperature by axilla?

To wipe the axilla thoroughly, to see that the arm is kept close to the side all the time the thermometer is in place.

What must be remembered when taking the temperature by rectum?

That the thermometer will not register the correct temperature if it is imbedded in feces; that the temperature must not be taken by rectum when there is any disease of the rectum; that the thermometer is to be lubricated before insertion; that if the patient is restless, there is danger of the thermometer being broken in the rectum.

Pulse

What is the usual ratio of the pulse to a temperature of 98.4° F.?

70 to 80.

What is the usual ratio of the pulse to a temperature of 100° F.?

80 to 90.

What is the usual ratio of the pulse to a temperature of 102° F.?

100 to 110.

What is the usual ratio of the pulse to a temperature of 104° F.?

120 to 130.

What are the common causes of a pulse becoming accelerated in undue proportion to the rise of temperature?

Hemorrhage, cardiac weakness, and certain diseases, as scarlet fever and septicemia.

What is a common cause of a disproportionately slow pulse?

Cerebral pressure.

What are the principal points for a nurse to consider in taking the pulse?

Its frequency, force, volume, rhythm, compressibility, and tension.

What is the average normal pulse in men?

60 to 70 beats per minute.

What is the average normal pulse in women?

65 to 80 beats per minute.

What is the average normal pulse in children above seven years?

72 to 90 beats per minute.

What is the average normal pulse in children from one to seven years?

80 to 120 beats per minute.

What is the average normal pulse in infants?

110 to 130 beats per minute.

What is the average normal pulse at birth?

130 to 160 beats per minute.

What may cause an increase of frequency in the pulse in health?

Eating, excitement, and the use of stimulants.

What are the abnormal causes of frequency?

Pyrexia, exophthalmic goitre, organic heart disease, certain lesions of the brain, reflex nervous irritation, an independent neurosis, certain drugs.

What are the causes of abnormal infrequency of the pulse?

Certain forms of heart disease; pressure at the base of the brain; convalescence from certain febrile disease, as typhoid; certain drugs.

What term would you use to describe the frequency of a pulse (a) 106 to 115? (b) 115 to 140?

(a) Frequent. (b) Running.

How is the force of the pulse described?

As weak or feeble, sluggish, normal, strong.

When some beats are feeble and others strong, how do you describe the pulse?

Irregular in force.

What is understood by the rhythm of the pulse?

Whether it is regular or irregular, intermittent, or dicrotic.

When is a pulse said to be dicrotic?

When the main beat is followed by a weaker one due to a rebound of the vessel.

When is this condition apt to occur?

In low fevers like typhoid when the arteries are relaxed.

What is an intermittent pulse?

A pulse is called intermittent when a beat is now and then lost.

Describe a high tension pulse.

The pulse remains persistently full between beats, and the force of the beat is relatively increased.

Respiration¹

What are the primary objects of respiration?

To supply the body with oxygen and remove CO₂.

Why does this interchange of gases occur?

When there is more than one gas in a space, the gases tend to intermingle so that they all become equally distributed throughout the whole space. Therefore, there being less oxygen in the tissues than in the blood and in blood than in the lung air-cells, the oxygen passes from the cells to the blood and from the blood to the tissues. There being more CO₂ in the tissues than in the blood and in the latter than the air-cells, it passes from the tissues to the blood and from the blood to the cells.

With what constituent of the blood does oxygen unite?

The hemoglobin.

What are the different parts of respiration?

Inspiration, in which the chest expands and the fresh air is drawn into the lungs; and expiration, in which the chest contracts and the air is expelled from the lungs.

How many cubic inches of air do the lungs take in at every inspiration?

From twenty to thirty.

How many respirations does it take to completely renovate the air in the lungs?

Fifteen or sixteen.

What is the normal rate of respiration?

16 to 18 per minute in adults.

¹ See page 237.

20 to 24 per minute in children.

24 to 30 per minute in infants.

What must be remembered when taking the respiration?

That the respiration is under the patient's control, and, therefore, should be counted without his knowing it.

How can this be done?

Hold the fingers on the wrist, as though still counting the pulse, while counting the respiration.

Mention expressions used in describing respirations.

Regular, irregular, quiet, noisy, easy, labored, deep, shallow, stertorous.

Mention some forms of respiration that indicate serious conditions, and describe them.

(1) Cheyne-Stokes respiration: there are two forms; in one, the respirations gradually increase in force and frequency up to a certain point and then as gradually decrease until they entirely cease and a short pause ensues before they begin again; in the other, the respirations increase as in the first form, but they stop suddenly. (2) Dyspnea the respirations are forced and labored, and there is always more or less cyanosis. (3) Edematous breathing: loud moist râles are heard, due to the infiltration of fluid into the lung tissue; dyspnea and cyanosis are always present.

What is the cause of hiccough?

Hiccough is due to a sudden contraction of the diaphragm accompanied by a spasmodic closure of the glottis.

When is hiccough an adverse symptom?

In any serious illness, but especially following abdominal operations.

CHAPTER V

TREATMENTS

Hot and Cold Baths. Counterirritants. Douches. Enemata. Rectal Irrigation. Entroclysis. Catheterization. Bladder Irrigation. Lavage. Gavage. Aspirations. Phlebotomy. Intravenous Infusion. Hypodermoclysis. Injections of Antitoxin. Vaccination. Intubation.

Hot and Cold Baths ¹

Of what use are cold baths in hyperpyrexia?

(1) They stimulate the vital process—*e. g.*, circulation, respiration, oxidation, etc.; (2) they relieve congestion of the internal organs; (3) they cause stimulation and quieting of the nervous system; (4) they reduce temperature. These results are brought about by the natural reflex response of the nervous system to cold. (See Appendix, page 370.)

Why is an ice-cap or cold compress put on the head?

Because the primary effect of cold upon the peripheral vessels is contraction and the driving of the blood to the interior, and cold on the head is therefore necessary to prevent retrostasis and determination of blood to the head.

Why is friction very essential during the bath?

To further reaction. (See page 371.)

(a) *Would you take a patient out of a bath if his pulse seemed much weaker than at the beginning of the bath?* (b) *Why?*

(a) Not unless it continued weak and there were other adverse symptoms such as the pulse becoming

¹ See Appendix, page.

irregular and the face cyanosed. (b) Because the apparent change in the pulse is only due to the contraction of the superficial blood-vessels by the cold.

What are the dangers to be guarded against in giving tub baths in typhoid fever?

Careless lifting, which may result in intestinal hemorrhage or perforation; too great shock. Also means must be taken to prevent water getting in the ears, and, especially, if the patient is a woman, the hair becoming wet.

How would you give a cold pack to a typhoid patient who had had a hemorrhage and could not be moved?

Protect the bed by putting a bath towel or small rubber as far under the patient as possible without turning him on either side, and one under his legs, put a binder around his loins, an ice-cap on his head, a hot-water bag at his feet. Have several towels (the number depending on their size) in a basin or foot-tub of water, the water being of the temperature ordered by the doctor. Wring the towels fairly dry, place them around the arms and legs and over the chest and abdomen. Have an extra towel with which to start changing those on the body. Change them in turn, one every half-minute, and rub the body, over the towels, between times. If possible to do so without turning the patient, rub the back with alcohol, rub the body with alcohol after removing the towels and fan the patient dry.

What are the principal purposes of hot baths and packs?

They are used chiefly to induce perspiration or to relax spasms.

Why should cold be applied to the head during a hot bath?

To prevent the dilatation and congestion of the cerebral blood-vessels and consequent vertigo or headache.

Is it only necessary during the bath?

No, the ice-cap should be put on the head at least half an hour before the bath and should be retained an hour or longer, if the patient has a headache, after the bath.

What are the bad effects to be watched for and guarded against in giving hot baths or packs?

A depressing effect upon the heart, burns, headache, fainting, chilling of the patient during or after the bath. (See Appendix, page 373.)

How are burns sometimes caused when giving packs?

By putting the hot-water bags next the wet blanket.

Counterirritants

Describe the action of counterirritants and how they relieve pain.

Through a nervous reflex action, the vessels of the skin are dilated by the irritation and those of the subjacent viscera are contracted and the blood driven to the surface, thereby relieving congestion and consequent pain.

(a) *Is it necessary for the application to be made directly over the seat of pain?* (b) *Give example.*

(a) No, it can be made at a distant part of the body. (b) A hot foot-bath is often given for relief of pain in the abdomen, colds in the head, or sore throat.

Mention the three classes of counterirritants and their purpose.

(1) Rubefacients or redners, used to obtain slight local irritation of the skin; (2) vesicants or epispastics,

which are intended to raise a blister; (3) caustics or escharotics, applied with intention to burn or form a slough.

In using mustard, what is important to remember regarding the temperature of the water used for mixing it?

That when irritation solely dependent on the mustard is required, the temperature of the water must not exceed 100° F.

Why?

Because the counterirritant action of mustard is due to volatile oil which is very quickly volatilized upon the addition of heat and thus lost from the mustard.

What must be done after removing a mustard paste and why?

The skin must be washed with soap and water in order to remove any adhering particles of mustard.

Mention some important points to remember regarding the making, applying, and removing of hot poultices.

(1) Poultices should thoroughly cover the prescribed area; (2) they must be light, and as hot as possible without burning; (3) they should be applied slowly, as the patient will then be able to stand a greater degree of heat; (4) the patient must never be exposed when the poultice is being applied or removed; (5) when a fresh poultice is not to be applied immediately, the part that has been poulticed should be covered with a flannel or quilted cotton jacket.

What is the safest way of applying turpentine stupes?

Mix the turpentine with oil, and rub this over the surface of the skin before applying the stupe.

What should be remembered in applying fomentations to the eye.

(1) The fomentations must be light in weight; (2) if there is any suspicion of suppuration, the same compress must not be used twice; (3) the compress must be changed about every two minutes (4) both eyes should not be covered by the same compress.

If too strong an application of iodide is made, how can it be removed?

By washing it with alcohol, ammonia, or oil.

When cupping, what precautions should be taken to avoid burning the patient?

A swab must not be kept lighted unless in use; the glass for the alcohol must be different from others; the lamp should be between the alcohol and the patient so that the lighted swab will not be passed over the alcohol; the alcohol must not be near the lamp; the swab must not be too large, nor be made too wet with alcohol; the rim of the glasses must not be allowed to get too hot; a second glass must never be put in the rim left by a former one.

Mention some points to remember when using cantharides.

(1) That a definite order be obtained from the doctor regarding the area to be covered, and the maximum period he wishes the plaster left on if a blister does not appear within the usual space of time; (2) the skin must be made surgically clean before applying the plaster; (3) the plaster should never be applied too tightly; (4) the skin must be carefully watched, as some skins will blister much sooner than others; (5) in removing the plaster, care should be taken not to tear the skin; (6) when dressing the resulting blister, aseptic precautions must be taken; (7) the urine must be watched for at least twenty-four

hours after its use because cantharides is apt to affect the kidneys.

How is cantharidal collodion removed?

By washing with ether.

How long does it usually take a blister to rise?

From four to eight hours.

Douches: Vaginal, Nasal, Aural, Eye

What are the principal purposes of vaginal douches?

Local cleansing and disinfection, local stimulation, the reduction of inflammation, and the arresting of hemorrhage.

What should be the temperature of a douche given to relieve hemorrhage?

About 124° F.

What, probably, would be the effect of a douche of 110° F.? Why?

An increase of the hemorrhage. Warm water will dilate the blood-vessels.

Mention some important particulars to remember when giving a vaginal douche.

Not to expose the patient; to make her as comfortable as possible; to place her so that the pelvis will be as high, or higher, than the shoulders; not to give the douche too quickly; to expel the air before inserting the nozzle in the vagina; to insert it downward and backward; to move it around all the time during the douche, in order that the entire cavity may be thoroughly cleansed; to shut off the current before all the solution escapes from the irrigator.

What danger attends nasal douching?

Washing discharge into the Eustachian tubes.

What measures should be taken to prevent this?

Have the solution of the right temperature, *i.e.*, about 110° F.; have it the right degree of alkalinity, *i.e.*, about one drachm of common salt to each quart of water; instruct the patient to keep his head bent forward, over a basin, all the time during the douche, not to breathe through his nose, not to blow his nose while it is filled with water, and not to swallow, for doing so dilates the openings of the Eustachian tubes.

How should you hold the auricle of a child's ear while giving a douche?

Backward and downward.

How much solution, and at what temperature, would you give an aural douche if the physician did not specify?

One to two quarts at a temperature of about 106° F.

What rule should be followed regarding the amount of force to use in giving an aural douche, and how will you regulate the force?

Considerable force is required when the douche is given to remove impaction of wax, etc., in all other cases but little force should be used. The force is regulated by the height of the irrigator; to remove an impaction it is held about three feet above the patient, at other times, one to one and a half feet.

(a) *How will you dry the ear after a douche?* (b) *What should you never put into a child's ear?*

(a) By inserting a pointed pledget of cotton in the ear, leaving it there a few minutes, then removing it and inserting a fresh one, and repeating this until the ear is dry. (b) A pointed instrument, as a probe.

Unless the doctor orders some special apparatus, what will you use to douche or wash out the eye, and how will you proceed?

Pledgets of absorbent cotton. First, wash away all loose pus from around the lids by squeezing the

solution from a pledget over the eye, being careful to direct the current from the inner angle of the eye outward, to avoid getting discharge into the lachrymal sac. Next, pull down the lower lid by pressing the thumb on the cheek just beneath the eye so as to expose the inner surface of the lid, and squeeze a stream of solution from the pledget over it; if any pus adheres to the lids wash it off, very gently, with the moistened cotton. To wash off the upper lid and cul-de-sac, catch the eyelashes of the upper lid between the thumb and forefinger of one hand; pull the eyelid forward and away from the eye, at the same time making pressure at the upper edge of the cartilage in order to evert the lid, and then squeeze the solution from a pledget in such manner that it will wash away all pus from the groove between the lid and the eyeball and the under surface of the lid.

Enemata

Mention the most common varieties of enemata and their uses.

Anthelmintic, given to destroy worms.

Antiseptic, given to destroy germs.

Astringent, given to contract the tissue and superficial capillaries; used in hemorrhage and certain forms of diarrhea.

Carminative, given to relieve flatulence.

Emollient, given to relieve irritation of the mucous membrane of the intestine, and so check diarrhea.

Nutritive, given to afford nourishment when it cannot be taken by mouth.

Purgative, given to increase peristalsis and wash out the intestine.

Sedative, used as a sedative, either local or general.

Stimulating, given for general stimulation.

Saline, given to supply fluid to the tissues.

What means can you take to insure the retention of enemata intended to be retained?

Unless the enema is intended for the purpose of stimulation, have it about 100° F.; use a small catheter, instead of the usual rectal tube, in order to minimize the irritation when inserting and removing it; lubricate the tube well, for the same reason; introduce the fluid very slowly. When there is difficulty in having the enema retained, it is often well to elevate the foot of the bed; to remove the funnel and tubing, clamp the catheter, and allow it to remain in the rectum for from half to three quarters of an hour; and to hold a folded towel against the anus whilst, and for some time after, giving the enema.

How should turpentine be prepared to give by rectum?

Made into an emulsion with oil. Heat the oil to 100° F. and add the turpentine.

How would you prepare a starch enema?

Dissolve one teaspoonful of starch in cold water, add six ounces of boiling water, boil three minutes. If too thick add more hot water; it should be of the consistency of a thin syrup.

How would you prepare milk for a nutritive enema? Why?

Peptonize it for two hours. Because the large intestine has no power of digestion, and the milk must therefore be well predigested if it is to be absorbed.

Why should patients receiving nutritive enemata be given a purgative enema daily?

Because, absorption in the large intestine being very imperfect, there is always a large residue from

the nutritive enemata, which, unless removed, will cause such irritation of the mucous membrane of the intestine as will interfere with the retention of the nutritive enemata.

Mention some important points to remember when giving a purgative enema.

Never to expose the patient; to cover the patient with a sheet other than that which is to remain on the bed; to protect the bed well; never to place the irrigator more than three feet above the patient; to remove the suds from the top of the fluid to be injected; to lubricate the tube thoroughly; to insert it very slowly, using no force; to regulate the flow of water so that it will enter the rectum very slowly; to endeavor to induce the patient to retain the enema for at least twenty minutes.

Mention purposes of enteroclysis and protoclysis.

(1) To supply the body with liquid when there has been an unusual loss. (2) To put extra fluid into the system (a) to give the heart more fluid to pump and thus make it strengthen its contraction and, in consequence, work more slowly; (b) to flush the kidneys and thus help them get rid of poisonous substances that have been taken into, or have been formed in, the body, and to prevent their being so much irritated by the poisonous substances they are endeavoring to excrete. (3) To wash out the intestine when there is any catarrhal or irritated condition of its mucous membrane. (4) To reduce flatulence. (5) To soften fecal matter and thus further the action of catharsis.

Mention precautions necessary in giving an enteroclysis. A protoclysis.

Enteroclysis. The tube for the outflow must be in-

roduced about four inches farther than that for the inflow. The free end of the former should not be more than one foot below the level of the patient in order to avoid too great suction and consequent drawing of the rectal mucous membrane into the holes of the tube. There must be no compression nor blocking of the outflow tube, for accumulation of fluid in the intestine is to be avoided. Something is wrong, if continuous pain is caused.

Proctoclysis. The liquid must not enter the intestine quicker than it is absorbed. The rate of flow must be regulated by the height of the irrigator, not by compressing the tube. The liquid must be kept at the required temperature.

Catheterization

What disease may result from improper or unsterile catheterization?

Cystitis.

How do you prepare catheters for use?

By boiling for five minutes. Silk catheters should be sterilized in corrugated trays, each catheter being placed in a separate division and stretched full length. The water in the sterilizer must be just deep enough to cover the catheters, but not to allow them to float.

How would you prepare for a catheterization?

Sterilize two catheters, place them, in the same basin in which they were sterilized, on one corner of a tray; cover basin and tray with a sterile towel; in the center of the towel, put a sterile dish containing sterile boric acid 2%, or other weak disinfectant, four sterile sponges, and, when a silk or rubber catheter is used, some sterile oil; cover the dish, sponges, etc., with an unused end of the towel; leave a corner of the tray

uncovered on which to put the kidney basin intended for the reception of the sponges after use. Cover the patient with a sheet and, in cold weather, a blanket; fold the bed-clothes neatly down to the foot of the bed. Have the patient lie on her back and flex and part her knees; drape the lower end of the sheet around her legs, gathering it up in the centre to expose the vulva. Place the bed-pan or urinal in position. Wash and disinfect my hands with as much care as for a surgical dressing; wash the region around the meatus urinarius with a disinfectant.

Mention some points to remember regarding the care of the catheter while catheterizing.

If the catheter is of glass, to inspect it carefully before inserting it to be sure that it is intact; never to touch the end that is to be inserted; to be careful that it touches no unsterile surface; to insert the catheter slowly, using no force; while withdrawing it, to put a finger over the opening, so that any fluid remaining in the catheter may not fall on the bed.

What will you do if the bladder is much distended? Why?

Draw off sixteen or twenty ounces and repeat the catheterization in two or three hours. If a distended bladder is emptied suddenly, cystitis, or other trouble, may result.

What steps can you take to encourage a patient to void urine before resorting to catheterization?

Place her on a bed-pan containing water as hot as it is possible to have it without burning; pour hot and cold water, alternately, over the vulva; if permissible, apply hot stupes over the pubic region; have her drink all the water possible.

Mention some cases in which a glass catheter should not be used.

For delirious patients, during labor, for small children.

Bladder Irrigation

(a) Is it well to use a glass catheter for irrigation of the bladder? (b) Why?

(a) No, a rubber catheter should be used whenever possible. (b) It is less likely to move during the irrigation than a glass one.

Give one method of bladder irrigation.

Have on hand, in addition to the things needed for catheterization, a flask containing the solution to be used; a sterile glass funnel with a piece of sterile rubber tubing, 18 inches in length, connected; and a sterile glass connecting tube in its free end. Catheterize the patient, but do not remove the catheter; expel the air from the tubing by letting some solution run through it; put the connecting tube over the free end of the catheter, and let about eight ounces of solution run into the bladder; then lower the funnel so that the injected fluid will return. Repeat the process until the required amount of solution has been used. Care must be taken not to allow the funnel to become empty before lowering it to obtain siphonage.

Lavage. Gavage

Mention some important points to remember when giving lavage.

To reassure the patient before beginning the treatment; to get as much air as possible out of the tube

by stretching it; to avoid touching the back of the pharynx while inserting the tube; never to let the funnel become empty before siphoning and to refill it as quickly as possible after siphonage; to pinch the tube whilst withdrawing it, to prevent drops trickling out and irritating the pharynx; to discontinue the lavage if there is any sign of blood in the water siphoned back.

What might the presence of blood indicate?

That the patient had a gastric ulcer.

What is the danger attending nasal gavage?

Passing the tube into the trachea.

How will you know that this has happened?

The patient will become cyanosed, and if the funnel is held to the ear a whistling sound will be heard.

(a) What will you do if the catheter is not easily inserted in the nostril and (b) why?

(a) Remove it and insert it in the other nostril.

(b) The septum is seldom straight and the smaller one nostril is, so much the larger will the other be.

When giving gavage to a patient who has had an operation upon the mouth, what special precaution must you take?

To pass the catheter sufficiently far into the esophagus to avoid the possibility of any fluid entering the mouth.

Aspiration

What is an aspiration?

The withdrawing of fluid from any of the closed cavities of the body.

What must be remembered when preparing for, and when assisting at an aspiration?

That all instruments, dressings, etc., must be thoroughly sterilized; the skin at point of puncture well cleansed and disinfected; and, during the operation, to watch the patient as he is apt to become faint.

What is the name given to abdominal aspiration?

Paracentesis.

What instruments, utensils, etc., are needed for paracentesis?

Canula and trocar; scalpel; probe; scissors; forceps; two needles; silk; two sterile towels; eight sterile sponges; a dressing containing two pieces of sterile gauze and one large piece of sterile absorbent cotton; adhesive plaster; a binder—preferably a scultetus; a long piece of rubber tubing, and, if the canula is not one to which the tubing can be connected, a sterile funnel; a slop jar to catch the fluid; two rubber sheets; sterile glasses containing the solutions necessary to disinfect the skin; hypodermic syringe loaded with cocaine and sterile needle attached; laparotomy stockings; extra pillows; bandages to tie the pillows in place; one blanket if the aspiration is to be done with the patient lying down, two if he is to sit on the edge of the bed; and in such case, two stools for the feet; stimulants as ordered.

How is the patient prepared for aspiration?

The abdomen is shaved and washed with soap and water, and later, when the patient is in position, with the disinfectants usually used in preparing the skin for minor operations; the patient must void urine immediately before the operation—many doctors require that women patients be catheterized; the laparotomy stockings are put on; and, if the patient is to sit up, he sits on the edge of the bed, near the head; one blanket is put around his shoulders, the

other around his legs; this is covered with a rubber; the pillows are placed close to his back, and secured in place by passing a bandage around them at both ends and tying it first at the edge of the pillows and then to the bar on the side of the bed on which the patient is sitting, or a special back-rest can be used.

What is hydrothorax?

Fluid in the thoracic cavity.

What are the usual causes of this condition?

In pleurisy, the excessive fluid is generally due to increased exudation or secretion by the cells of the pleura. In heart disease, the usual cause is transudation of serum, etc., through the blood-vessels, this transudation having been rendered possible either by the diseased condition of the blood-vessels, or by stasis in the same, due to the poverty of circulation.

What are the requisites for aspiration of the chest?

The aspirating apparatus; a hypodermic syringe, loaded with cocaine, with sterile needle attached; sterile glasses containing the disinfectants necessary for cleansing the skin; eight sterile gauze sponges; two towels; collodion and sterile swab, if the point of puncture is to be painted with collodion, otherwise, a sterile dressing and adhesive plaster; a sterile solution basin containing sterile water for testing the apparatus; a dressing rubber; kidney basin; nightingale; stimulants.

What must be remembered regarding the pump used to exhaust the air in the bottle of the aspirating apparatus?

That some pumps are ruined by boiling or by drawing fluid into them and that such are never really sterile and must not be put next the sterile things.

What are the requisites for aspiration of the pericardium?

The same as for aspiration of the thorax, except that a small trocar and canula is often used instead of the aspirating apparatus; when this is the case a sterile test tube will be needed to receive the fluid drawn from the cavity.

Why is lumbar puncture performed?

Principally, to relieve pressure on the spinal cord by removing the excess liquid collected in the spinal canal.

What will be necessary for the operation?

A trocar and canula or large aspirating needle; hypodermic syringe loaded with cocaine and ready for use; sterile glasses with the disinfectants necessary for cleansing the skin; a sterile test tube; collodion and sterile swab or sterile gauze and adhesive plaster for dressing; dressing rubber; kidney basin; and blanket or nightingale.

(a) *What is phlebotomy or venesection?* (b) *Why is it performed?*

(a) The taking of blood from a vein. (b) It is performed either to relieve arterial or venous engorgement or to remove toxic blood from the body—as in gas or uremic poisoning.

What instruments, etc., will be required for phlebotomy?

Aneurism needle; 2 artery clamps; 2 forceps; 2 needles; probe; scalpel; scissors; 8 sterile sponges; 2 sterile towels; catgut; silk; sterile glasses containing the disinfectants for cleansing the skin; a sterile graduate glass for the reception of the blood; sterile solution basin containing sterile salt solution; kidney basin; dressing rubber.

What is hypodermoclysis?

The introduction of fluid into the cellular tissue.

What is intravenous infusion?

Injection of fluid into a vein.

For what purposes are hypodermoclysis and intravenous infusion given?

To supply the system with fluid for the purposes mentioned on page 43, in connection with enteroclysis and protoclysis. Intravenous infusion and hypodermoclysis, more especially the former are generally used when an immediate effect is important.

What solution is generally used for these treatments?

Normal salt solution.

What is normal salt solution?

A 7 $\frac{1}{2}$ per cent. solution of sodium chlorid.

Why is normal salt solution so universally used for such purposes?

Sodium chlorid is one of the important constituents of the blood and, in proper proportion, is one of the few substances that can be introduced directly into a vein without causing hemolysis. The salt of itself is not a stimulant, the stimulation following the use of the solution is due entirely to the effect of the extra amount of fluid in circulation and to the heat.

What precautions are necessary in the preparation of the solution, especially when it is intended for intravenous infusion?

To make it sterile and free from any foreign substance, therefore, distilled water is used. To have the percentage of salt accurate or hemolysis may follow the use of the solution.

In an emergency what could you use for giving a hypodermoclysis?

A douche bag or can with rubber tubing attached and a hypodermic needle sterilized by boiling.

(a) *What special care must be taken of tubing used for these purposes and for aspiration?* (b) *Why?*

(a) After use, it must be thoroughly dried on the inside. (b) When coiled up while wet the rubber becomes softened, and small particles may be washed off and enter the tissues or blood with the solution, or, in the case of aspiration, get into the valves of the apparatus and put it out of order.

What is the difference in the nature and action of a vaccine and an antitoxin serum?

A vaccine consists of either attenuated bacteria or of toxins formed by bacteria. The active principle of antitoxin sera are thought to be substances formed in the body of some animal as the result of the action of bacterial toxins on the body cells. Vaccine causes the recipient to have a mild attack of the disease caused by the germ used and his own cells form the antitoxin, but an injection of antitoxin serum provides the receiver with the protective substance and his own cells take no part in its formation.

What is a common dose of diphtheria antitoxin?

2000 to 4000 units.

How would you prepare the skin for the injection?

Wash it first, with soap and water, and then with alcohol or other disinfectant.

How would you take a throat culture?

Place the patient in a good light; rub any exudation or patch that may be present in the throat with a sterile cotton swab; remove cotton plug from culture tube, being careful that it touches nothing unsterile, and, holding the tube slanting to prevent contact with swab, insert the swab, rub it gently but freely over the surface of the media therein; and reinsert the cotton plug.

How should a child be held for intubation?

He should be rolled in a blanket. If he is to be

held in the nurse's lap, she should sit with her legs crossed and secure the child's legs between hers; she should secure the arms by putting her arm across his chest and grasping his far arm—over the blanket—above the elbow. Unless there is a second assistant she must with her other hand hold the mouth-gag and steady his head against her shoulder.

When the operation is to be done with the child lying down, he must be placed across the bed or on a table with his head extending beyond the edge and firmly supported by the nurse.

What are the requisites for intubation?

A mouth gag; the introducer; the extractor; a tube with a loop of linen thread about twelve inches long, tied securely in the perforation at its upper end; a metal finger cot or adhesive plaster to make a protector for the doctor's finger.

If it were necessary for a nurse to perform the intubation, how should she proceed?

Take a tube—the number of which corresponds to the child's age; see that it is threaded and connect it with the obdurator of the introducer. Protect the index finger of the left hand with a metal cot or adhesive plaster; put the mouth gag in the child's mouth and then, with the protected finger, hold down its tongue and lift the epiglottis. Pass the introducer into the mouth alongside the finger; slip the tube into the trachea, and press it into position with the finger; remove the obdurator from the tube. If the tube is in the trachea, the breathing will be improved as soon as the gush of mucus discharge, caused by the violent respiratory effort that takes place upon the introduction of the tube, is over. If the tube has been put into the esophagus, no improve-

ment will take place, in such case, the tube must be removed by pulling the thread. After the tube is in place, this string is either put around the ear and secured in position by fastening a piece of adhesive plaster over it, across the cheek, or it is removed, and the tube taken out, when desired, with the extractor. Before removing the thread the knot must be cut off, otherwise, if the wrong end is drawn through the tube, the knot coming to the hole will displace it.

CHAPTER VI

MEDICINES

Methods of Calculating Fractional Doses. Common Abbreviations used in Writing Prescriptions, etc. Methods of Administering Medicines. Rules to be Observed in the Dispensing of Medicines.

If you are to give gr. $\frac{1}{25}$ of strychnine and the solution on hand is $\mathfrak{M} x = \text{gr. } \frac{1}{30}$ how will you estimate the number of minims to give? How many minims will you give?

(a) Multiply the denominator of the fraction of the amount of drug in the solution on hand by the number of minims containing it, and divide the result by the denominator of the dose that is to be given.

(b) 12 minims.

(a) *If the dose to be given is in tablet form, and you are told to give gr. $\frac{1}{150}$ and the tablets you have are gr. $\frac{1}{100}$, how will you estimate how much to give?* (b) *How much will you give?*

(a) Make a fraction using the larger dose as the denominator and the smaller as the numerator; reduce the fraction to its lowest term and the result will be the part of the tablet to be used. (b) $\frac{2}{3}$ of the tablet.

How will you reckon the quantity for a child's dose?

Make a fraction, using the child's age for the numerator and the child's age plus 12 for the denominator, reduce the fraction to its lowest terms and the result will be the part of the adult dose that is required.

What part of an adult's dose would a child of 8 require?

$\frac{2}{5}$; thus $\frac{8}{20} \div 4 = \frac{2}{5}$.

How can you make an approximate estimate of the comparative value of apothecaries' and metric liquid measure?

Reduce the amount required to drams, and multiply by four.

How can you approximate the comparative value of apothecaries' and metric weights?

Reduce the quantity to grains, move the decimal point one place to the left, subtract one third.

What does the symbol āā. stand for?

Ana, of each.

What does the symbol ad lib. stand for?

Ad libitum, as much as desired.

What does the symbol alt. hor. stand for?

Alternis horis, every other hour.

What does the symbol alt. noc. stand for?

Alterna nocte, every other night.

What does the symbol b. i. d. stand for?

Bis in die, twice a day.

What does the symbol c. stand for?

Cum, with.

What does the symbol cc. stand for?

Cubic centimetre.

What does the symbol dil. stand for?

Dilutus, dilute.

What does the symbol gtt. stand for?

Gutta, a drop or drops.

What does the symbol ℥ stand for?

Misce, mix.

What does the symbol ol. stand for?

Oleum, oil.

What does the symbol p. c. stand for?

Post cibum, after meals.

What does the symbol pil. stand for?

Pilula, a pill.

What does the symbol p. r. n. stand for?

Pro re nata, as occasion arises.

What does the symbol q. h. stand for?

Quaque hora, every hour.

What does the symbol q. s. stand for?

Quantum sufficit, as much as is sufficient.

What does the symbol R stand for?

Recipe, take.

What does the symbol ss. stand for?

Semissis, half.

What does the symbol t. i. d. stand for?

Ter in die, three times a day.

What does the symbol tr. stand for?

Tinctura, tincture.

What does the symbol ung. stand for?

Unguentum, ointment.

What does the symbol $C_2 H_5 OH$ stand for?

Alcohol.

What do the symbols H_2O , CO_2 , and HCl stand for?

Water, carbon dioxid, and hydrochloric acid.

What does the symbol $NaCl$ stand for?

Sodium chloride.

Mention the ways in which medicine may be introduced into the circulation.

Through the stomach, rectum, subcutaneously, by inunction and inhalation.

What is the average length of time required for the absorption of medicine given subcutaneously?

Five minutes.

Mention conditions in the stomach and in medicine which will influence the rate of absorption of medicines given by mouth.

Medicine will be absorbed quicker when the stomach

and the intestine are empty. Medicines containing alcohol, such as tinctures, will be absorbed more readily than solutions, and solutions, than pills and powders.

What is the average length of time required for absorption of medicine given by rectum?

Three quarters of an hour.

Why should some medicines not be given after eating?

Because their nature will be entirely changed by the salts and hydrochloric acid of the gastric juice present in the stomach after a meal.

When should alkalies be given?

Unless they are intended to neutralize the hypersecretion of hydrochloric acid, they should be given shortly before meals.

When should bitters be given?

Shortly before meals.

When should acids be given?

Shortly after meals.

When should such drugs as iron, arsenic, and potassium iodide be given? Why?

After meals. Because, if given when the stomach is empty, they may irritate the mucous membrane.

How are syrup cough medicines given? Why?

Undiluted. To obtain the soothing effect of the syrup on the mucous membrane of the throat.

How can oleum tiglii—croton oil—be given to an unconscious patient?

In melted butter dropped on the back of the tongue.

When should cathartics be given?

Salines are best given before breakfast, slow acting cathartics, at night.

Mention some important rules to remember regarding the giving of medicine.

(1) Never to speak to any one or to think of any-

thing but the work on hand when measuring medicines.

(2) Always to measure medicine accurately. (3) To give medicines strictly on time. (4) Never to give a medicine without reading the label on the bottle thrice, before taking the bottle from the shelf, and before and after pouring the medicine. (5) To shake the bottle before pouring the medicine. (6) Never to mix or give at the same time medicines which change color or form a precipitate when put together. (7) While pouring the medicine, to hold the glass with the mark of the amount required on a level with the eyes. (8) To make medicines as palatable as possible, therefore, to use very cold or very hot water as a diluent, and not to dilute them more than necessary.

What foods must be avoided when giving calomel?

Acids, salts or salty food, milk and albumen.

Why should iodine preparations not be given shortly before or soon after the taking of starchy food?

Starch neutralizes the effect of iodine.

What rule should every nurse make regarding the giving of narcotics and anodynes, the administration of which is left to her discretion?

Never to give one until she has tried every other method in her power to relieve pain or sleeplessness.

Why?

Such medicines all have a more or less deleterious effect on the gastric or nervous systems. Beside there is always the danger of the patient contracting the "drug habit."

What are the usual causes of hypodermic abscesses?

Impure drugs, unclean skin at the point of puncture, unsterile syringe or needle.

How should hypodermic needle and syringe be sterilized?

Preferably, by boiling for one minute, or by alternately filling with and expelling alcohol 70%, at least six times.

Where should hypodermics never be given?

In the inner surface of the thighs or arms, the breasts, over a blood-vessel, or bony prominence.

Describe the giving of a hypodermic.

Wash the point of puncture well, with alcohol, using a sterile sponge. Take up and hold firmly, between the finger and thumb of the left hand, a cushion of muscle, stretching the skin while doing so. Insert the needle quickly, in an almost vertical direction, deep into the tissue, being careful not to touch the piston while doing so. Press the piston gently to inject the fluid. Remove the needle, holding an unused end of the sponge against it. Knead the spot gently for a few seconds to hasten absorption.

What should be done to the needle before putting it away?

It should be disinfected with alcohol as before use, and then thoroughly dried by inserting and withdrawing a wire, wiping it before each reinsertion, until the inside is thoroughly dry.

How would you dissolve a tablet for hypodermic injection?

Put the tablet with a few minims of warm, distilled, sterile water in the syringe, attach the needle, having first sterilized it and the syringe, adjust the piston, expel the air, and shake the syringe until the tablet is thoroughly dissolved, being careful not to let anything come in contact with the needle.

If ordered to give two drugs at the same time, how would you fill the syringe?

Pour or draw in the first drug, expel the air, measure

the second drug in a *sterile* minim glass, draw it into the syringe, being careful not to suck in air by drawing the solution farther than the needle.

How would you give a stramonium inhalation?

Put the stramonium leaves in a bowl, set fire to the leaves, fasten a cone of stiff paper over the bowl, and have the patient inhale the smoke through the free end of the cone.

How can a calomel inhalation be given?

Place an alcohol lamp in a large basin, and across this place a couple of rods made of iron or other non-inflammable material; on this place a tin plate containing the calomel powder. Put this apparatus on a chair near the head of the bed, and with a sheet and sticks arrange a canopy which will include the chair and upper part of the bed. The sheet must be so arranged that the calomel fumes will not escape but that a corner of it can be drawn aside from time to time to watch the patient. Light the lamp. The duration of the inhalation is always ordered by the doctor. The person giving the inhalation must be careful not to inhale the fumes, as any one in a normal condition would become salivated by so doing.

What must be remembered when spraying the throat?

That the back of the tongue must be held down so that the medication may reach all parts of the tonsils and the larynx. Not to touch the back of the throat and thereby cause nausea.

How would you put atropine in the eye?

Separate the lids with the thumb and first finger of the left hand, making pressure on the frontal and malar bones, and have the patient look up; at the outer

angle of the trough thus formed, drop in the medicine, being careful not to let the dropper touch the eye.

Why is medicine put in near the outer corner?

Because, if it is put in near the opening of the lachrymal sac, it will flow immediately into the sac and the eye will not be benefited.

(a) *Should medication applied for the purpose of cleansing the eye be applied in like manner?* (b) *Why?*

(a) No, it should be put in at the inner angle. (b) Because if put in at the outer angle the discharge around the lids will be washed into the lachrymal sac, and a serious inflammation might result.

How should medication be applied to the lids?

Evert the lids well and drop the medication directly on them.

How would you evert the lower lid?

Place the thumb on the cheek near the margin of the lid, and press the latter downward while the patient looks upward.

How would you evert the upper lid?

Hold the lashes between the thumb and first finger, pull the lid downward and forward, away from the eye, place a probe, toothpick, or other similar object, or the tip of the finger at the upper edge of the cartilage, and turn the lid back.

CHAPTER VII

SURGICAL NURSING

Care of Patients before and after Operation. Surgical Dressings. Care of the Operating Room. Care of the Patient during Operation.

Care of Patient

In preparing a patient for operation what are the points to be considered?

To avoid tiring the patient; to encourage and reassure him; to cleanse the body thoroughly, including the hair, paying special attention to those parts of the body in which dirt and sebaceous matter are apt to accumulate, as the nails, toes, umbilicus, groin, axilla; to make the seat of operation as sterile as possible; to be sure that the bowels are fairly empty; that the patient voids urine immediately before going to operation; and that he has no false teeth.

What general preparation would you give a patient before operation?

(The pupil should be required to give in detail the hospital rules for the preparation of patients for operation.)

What local preparation would you give a laparotomy? A perineorrhaphy? An excision of the jaw?

(The pupil should give the hospital rules for the preparation for these operations.)

Why is it of special importance that the bladder be emptied before abdominal section?

There is danger of the surgeon making an incision into the bladder if it is in the least distended.

What accidents are to be watched for after operation?

Heart failure; suffocation, due to the tongue falling back over the trachea, or mucus, or vomitus getting into the trachea; hemorrhage, burns from hot water-bags.

What measures are taken to prevent heart failure?

The bed is warmed; the patient kept quiet and warm with his head low; before the patient returns to the ward everything necessary for giving stimulation by rectum or hypodermic is prepared for instant use and the blocks used for elevating the bed brought to the bedside.

What could you use in a private house instead of blocks?

A strong chair or table.

What will you do to prevent the tongue falling back and mucus, etc., entering the trachea?

Keep the patient's head turned on one side and my fingers behind the angle of his jaw, throwing the jaw forward and pressing against the root of the tongue.

What are the symptoms of hemorrhage?

The pulse becomes rapid and weak, the respiration rapid, shallow, and sighing; the color pale; the patient grows restless and, if sufficiently conscious, complains of thirst and lack of air.

What, as a rule, are the four greatest causes of discomfort to a patient after abdominal operation?

Thirst, nausea, flatulence, and pain in the back.

(a) *What can you do to relieve thirst?* (b) *If water is allowed how should you give it?*

(a) Wash the mouth frequently with a lubricating mouth wash to counteract the dryness caused by the

anesthetic. (b) In small amounts and either very hot or very cold.

How should ice, given to relieve nausea, be prepared?

It should be crushed so fine that it can be swallowed as ice, and in order to prevent it melting quickly, a piece of gauze should be tied over a glass and the ice placed on this so that the water will drain off.

After an abdominal operation, how can strain on the stitches be avoided when a patient vomits?

By placing the hands on either side of the abdomen in such fashion that the edges of the wound will be held together while the patient is vomiting.

Why is increasing flatulence a serious symptom?

It shows lack of peristaltic action and may be due to paralysis of the intestine.

What treatment is often ordered to relieve flatulence?

Turpentine stupes, and the insertion of the rectal tube.

How would you apply the stupes?

Mix the turpentine with oil in the proportion of from equal parts oil and turpentine, to one of turpentine and four of oil for an adult, and about one of turpentine to eight of oil for a child. Cover the trunk to below the abdomen with a blanket, turn down the bed-clothes to the edge of the blanket, remove the binder, and cover the dressing with a piece of sterile rubber tissue or oil muslin, securing it in place with adhesive plaster; cover the abdomen with another piece of oil muslin or a small dressing rubber. Have at the bedside, a basin of boiling water, if possible, on an alcohol or other stove, a stupe wringer or heavy crash towel, two pieces of soft flannel twice the size of the abdomen, and a swab for the application of the turpentine. Rub the turpentine over as much

of the abdomen as possible without touching the dressing. Put the flannel in the centre of the towel, dip this into the boiling water and let it stay long enough for the heat to penetrate to the centre; wring the flannel, very dry, by twisting the ends of the towel in opposite directions. Open the towel, take out and shake the flannel quickly, to incorporate air, and pass it doubled under the upper protector. Change the flannel every two or three minutes for the length of time ordered; if the skin will stand it, make an application of turpentine each time the flannel is changed. While one piece of flannel is on the patient the other should be in the boiling water.

(a) *When you insert the rectal tube what must you do to protect the bed?* (b) *Why?*

(a) Place the free end in a bed-pan, kidney basin, or oakum pad. (b) Fecal matter is very apt to be discharged with the gas.

What measures can you take to relieve pain in the small of the back, when the patient is obliged to remain in the dorsal position?

Knead the muscles of the back with the fingers, rub the back with alcohol, frequently; place small pads, pillows, or hot-water bags, filled with warm water, in the hollow of the back.

(a) *When is a patient put in Fowler's position?* (b) *Why?*

(a) When there is any quantity of pus in the abdominal cavity. (b) To keep the pus away from the lymphatic glands that are situated in the upper part of the abdomen and so lessen the amount of absorption; to facilitate drainage.

What adverse symptoms must be watched for when a patient is in a sitting position after operation?

Symptoms indicating that there is too great strain on the heart; the pulse will be the best guide,—it will become more frequent, irregular, and weak.

What can a nurse do to lessen strain on the heart?

Provide such support that it will not entail any effort on the part of the patient to maintain his position.

Describe some methods of doing this.

(The pupil should be required to describe the method or methods used in the hospital in which she is a student.)

The following are methods used in several hospitals.

A back-rest, and sufficient pillows to support every part of his back and provide rests for his arms, are placed behind and beside the patient when he is raised to a sitting position, and one or other of the following means are taken to prevent his slipping down in bed.

(1) A pillow, doubled over a bandage, is placed under the patient's knees or at his feet, and the ends of the bandage tied to the head of the bed.

(2) A sheet is folded, lengthwise, the width of a pillow, a hair pillow placed in the centre, and the sheet doubled over it. The sheet must be sufficiently long to allow of its two ends being pinned together to a bar at the head of the bed, the bar being on a line with, or slightly below the level of the mattress when the pillow is in position under the patient. The patient is raised to a sitting position and the pillow placed under him; it must extend beyond the buttocks and come well up under the thighs. A scultetus binder is fastened around the pillow and upper part of the patient's thighs.

(3) A sheet is folded, lengthwise, about the width

of the patient's thighs, one end is fastened to a bar at the head of the bed, on a line with the mattress, the other to a bar at the foot of the bed, a scultetus binder is put under it and the ends brought up and fastened around the patient's thighs. A pillow, doubled over a bandage, is placed at the patient's feet, the ends of the bandage are tied to the bar at the side of the bed, a little above the level of the feet, and then to the bar at the head of the bed on a line with the mattress. A board may be used instead of the pillow. The board should be about six inches wide and twenty-four long; it should have a hole at both ends. A rope is run through these holes and tied to the posts at the head of the bed. A pillow or folded sheet should cover the board.

Mention some important points to remember in the care of patients after tracheotomy.

(1) So long as there is any danger of the tracheotomy tube becoming blocked, the patient must not be left alone for *one second*. (2) The tube must be kept free from mucus, and the cleansing must be done quickly and care taken, while doing it, not to allow any particles of the dried mucus, or threads of the gauze used in cleansing, to get into the trachea. (3) Unless a steam-tent is ordered, a piece of moist gauze must be kept over the mouth of the tube in order to moisten the air entering the trachea.

How will you wash the tube?

Either by removing the inner tube, washing it quickly in sterile water or salt solution, drying it *carefully* on sterile gauze, and reinserting it, or by winding sterile absorbent gauze tightly around a curved probe, being careful of the following points: To roll the raw edges of the gauze innermost so that

no loose thread will be left in the tube and so get into the trachea; to have the gauze sufficiently long to allow of its being held and all risk of its slipping from the probe thus avoided; not to have the roll large enough to obstruct the tube.

Describe the feeding of a patient after gastrotomy when the food is to be put into the stomach through a catheter which has been inserted therein.

The required food is heated to body temperature. A small funnel is put into one end of a piece of tubing about six inches in length, and a connecting tube into the other; some of the liquid is poured through this to expel the air, a little being retained in the funnel; the free end of the connecting tube is inserted in the catheter; the catheter is unclamped and the fluid allowed to run in slowly. The funnel must never be allowed to become empty, or air will be introduced into the stomach. Care must be taken in handling the catheter, as there is danger of its slipping both into and out of the stomach. The catheter must be re-clamped before disconnecting the tubing.

Mention two dangers to be guarded against in the care of a perineorrhaphy, and the preventative means to be employed.

Tearing and infection of the stitches. To prevent tearing, (1) for the first forty-eight hours, and longer, if the patient is restless, a binder should be put around the knees. (2) When there is the slightest straining during defecation, the nurse should put on a rubber glove or cover her hand with paper, and hold the sutured parts together. (3) If a vaginal douche is ordered, a catheter should be used instead of a douche nozzle. (4) When irrigating the stitches, the water should not be allowed to flow with any degree of force,

and care must be taken when drying them not to make any traction on them.

To avoid infection, the stitches and all surrounding parts must be irrigated and carefully dried after every micturition or bowel movement, and a sterile gauze dressing must be applied after each irrigation. Before doing the irrigation, the nurse should disinfect her hands as when preparing for a surgical dressing. Some doctors require their patients to be catheterized for at least twenty-four hours after operation.

After any operation, how long would you let a patient go without voiding urine, before reporting it?

Not more than eight hours.

(a) Why is the urine examined before operation? (b) After operation?

(a) It is examined before operation to ascertain, more especially, if there is any disease of the kidneys or if there is sugar in the urine for, when such exist, general anesthetics are not given unless absolutely necessary, as they increase such conditions and wounds may not heal, if a person has diabetes. (b) To see if the anesthetic has had any ill effect.

When should the urine be measured after operation?

After all operations on the kidneys or bladder; for twenty-four hours after any operation which necessitated the giving of an anesthetic for more than a few minutes, and longer if the patient experiences any trouble in voiding urine or if an insufficient amount is passed.

Surgical Dressings

Mention one of the most important items in the care of patients after operation.

Care in the dressing of their wounds, and in the preparation of the dressings, in order to prevent infection of the wounds.

Mention some "breaks in asepsis" that a nurse is likely to make if she is not careful when preparing dressings, or dressing a wound.

When opening a sterile towel, letting it touch against some unsterile object; pouring out solutions or lotions without washing off the rim of the bottle with a disinfectant; placing covers or stoppers inner side downward on an unsterile table; leaving jars of sterile supplies uncovered; touching the side of the sterile towel used for taking hold of sterile objects, with what has become unsterile.

How should a dressing that has stuck to the wound be removed?

It should be wet with solution before attempting to remove it, and when lifting it off, pulled from both edges toward the centre, in order to avoid separating the edges of the wound. If there are stitches, care must be taken to avoid pulling them.

(a) Will you wash the surface surrounding a wound away from, or toward, the wound? (b) What care will you take while washing?

(a) Away from the wound. (b) Hold the edges in apposition in order to prevent their becoming separated.

How can the gum of adhesive plaster be removed?

By washing with ether or benzine.

When applying a Bier's cup over a wound, what precautions should be taken?

It must be sterile, the rim of the cup must not be too near the edge of the wound; a vacuum must not be created too quickly nor too completely, or pain will

result; when a glass with a rubber cuff is used, the latter must not be adjusted too tightly.

Give one very important reason why a dressing should be reinforced or changed as soon as discharge oozes through.

The gauze is no longer impervious to germs.

Care of the Operating Room

Mention points to be considered in the general care of the operating room.

(1) Cleanliness of the operating room: Not only must all dust be removed, but it must, as far as possible be prevented entering, therefore, windows are never opened in the operating room except when absolutely necessary, and all windows, either in the operating or adjoining rooms, are screened with fine netting covered with two or three thicknesses of gauze which is changed whenever it becomes the least soiled. All ventilators are covered with non-absorbent cotton filters, or else screened in the same manner as the windows. The floors are scrubbed daily, and the walls at least once a week; no sweeping should ever be done in the operating room. Between operations, the floor should be mopped with a disinfectant. The mop used must be kept exclusively for this purpose, and, when not in use, should stand in a disinfectant. (2) Order: There must be an exact place for everything belonging to the operating room, everything must always be returned to its proper place, and every one connected with the operating room must know where that place is. Every one connected with the operating room must know exactly what his work is, and assume the responsibility for that work. (3) Asepsis: The

strictest asepsis must be maintained, not only during operations, but in the minutest detail of the preparation of everything that may come directly or indirectly in contact with the wound. (4) Temperature: During operations the temperature of the operating room should be kept at between 74° and 80° F.

Why is it necessary to keep the operating room so warm?

During anesthesia the skin circulation is poor and the vitality low; therefore, unless the patient is kept in warm surroundings, he will suffer more greatly from shock, and may be the victim of one or other of the diseases caused by chilling of the body.

What care should utensils such as pitchers, hand-basins, etc., receive?

After operation they should be rinsed in cold water, and all stains removed; they should be then washed in warm water and soap suds, and either sterilized in a utensil sterilizer for ten minutes, or disinfected by standing in a disinfectant for from one to two hours according to the strength of the disinfectant. They are rinsed and sterilized again before use.

When sterilizing glassware what care must be taken?

Glassware must be put into the sterilizer while the water is cold and the water allowed to cool before it is removed.

What care do you give the instruments after operation?

(1) Count them; (2) detach all detachable ones; (3) rinse them in cold water; (4) sterilize them; (5) scrub them with a cork and bon ami or emery and hot water; (6) dry them; (7) put those which have been detached together; (8) count them; (9) put them away. All missing instruments should be found or accounted for before going off duty.

Mention some things necessary to remember in regard to the thermocautery.

(1) It gets out of order very easily, and should therefore be tested long enough before operating time to have any trouble rectified; (2) before operation, to replenish the benzine in the benzine chamber; (3) when handing the cautery to the operator, to keep it at a distance from the anesthetic; (4) to heat it thoroughly after use, in order to burn off any adhering particles, and to cool it slowly.

What should you do for the patient before the anesthetizer begins the anesthetic?

Endeavor to reassure him, ascertain that he has no false teeth, unbutton the nightgown at the neck.

Mention some things to remember when putting a patient on the table.

That there must be no exposure while getting him in position; that the blankets and towels must be arranged so as to thoroughly expose the part to be operated on, but no other portion of the body; that the arms must be carefully secured in place, so that there will be no danger of their hanging over the table.

In what position will you put a patient for amputation of the breast?

In the dorsal position with a flat sand-bag under the back on the affected side, the head turned toward the other side, the arm of the affected side flexed at the elbow and abducted to a right angle at the shoulder, the wrist tied loosely to the head of the table, the other arm close to the patient's side.

What should be remembered when putting the patient in the lithotomy position?

That the buttocks must rest on the very edge of the table.

CHAPTER VIII

EMERGENCIES

Treatment for Burns and Frost-Bites. Removal of Foreign Objects from Various Parts of the Body. First Aid Treatment for Fractures; Dislocations; Sprains; Strains; Hemorrhage; Shock; Wounds; Unconsciousness; Convulsions; Poisoning.

Burns and Frost-Bites

How are burns usually classified?

As of first, second, and third degrees.

Describe each class.

In a burn of the first degree there is only redness or slight inflammation of the skin. In one of the second degree there is inflammation accompanied by blebs or vesicles. In one of the third degree there is charring and destruction of the skin and deeper tissues.

Which is the most dangerous, a burn of the third degree that only involves a small part of the body, or one of the first degree involving a considerable portion of the body?

That of the third degree may interfere more seriously with the function of the affected part, but a burn that involves a large skin surface is likely to be followed by more serious systemic effects, even if it is only of the first degree.

Why?

(1) There is a larger surface from which a purulent discharge is being absorbed; (2) so that a septic condition or inflammation of some of the internal organs is more likely to follow and heat elimination by the skin is interfered with.

Mention some frequent causes of death following burns.

Shock; pneumonia, due to the inhalation of smoke; hemorrhage, from the sloughing of blood-vessels; and inflammation of the internal organs due to absorption of purulent matter from the discharge.

In treating a person who has been badly burned, what abnormal condition is to be attended to first?

Shock, which is present to a more or less marked degree even with a comparatively slight burn.

What care must be taken when removing the clothes of a person badly burned?

To avoid breaking the blisters.

What measures will you take to avoid doing so?

Soften all clothing that sticks to the skin with oil, a warm solution of bicarbonate of soda, or warm sterile water.

What is a common form of treatment for scalds and burns of the first degree due to heat?

Covering the injured surface with gauze or soft muslin wet in a solution of bicarbonate of soda, or carron oil.

What will you do for a burn when blisters have formed?

Puncture the blebs with a sterile needle or sharp-pointed knife and allow the serum to escape, taking care not to remove the skin of the blebs as it forms a protective covering for the parts underneath. A dressing of soda bicarbonate, boric ointment, or the like, may be used, but if the burn is extensive, the dressing must be so applied that, when it is changed, only a small section of the wound need be exposed at a

time. If the patient is kept in a warm bath, about 90° F., the wounds are dusted with powder, such as stearate of zinc, and exposed to the air.

How would you treat burns caused by acids?

With the exception of carbolic acid, by neutralizing the acid with an alkali; such as lime water, washing soda, soap, or chalk, and then dressing as any other burn.

What would you use for a burn from carbolic acid?

Alcohol.

What will you use for burns from alkalis?

A weak acid, as vinegar or lemon juice.

How is a frost-bite treated?

The patient is kept in a cold atmosphere and the frozen part rubbed gently with snow, ice, or cold water until circulation is established.

Removal of Foreign Bodies

How would you remove a foreign body from under the upper eyelid?

Either draw the upper lid well down over the lower lid, so that as the upper lid returns to its normal position its under surface will rub against the lashes of the lower lid and the substance be dislodged, or turn the lid up over the tip of the finger, a match, or a pencil so as to expose its under surface and remove the particle with the corner of a piece of gauze or handkerchief.

If the substance was under the lower lid how would you proceed?

Draw the lid down against the cheek-bone and instruct the patient to look up, or turn the lid over so as to expose its under surface, and then brush off

the particle with the corner of a piece of gauze or handkerchief.

What should you do, and not do, to remove foreign bodies from the ear?

If the foreign substance is a seed, or other body that will swell under the influence of oil or water, syringe the ear with alcohol, as this will cause it to shrink. If an insect or hard substance that will not swell is the cause of trouble, syringe with oil or warm water. When syringing, be careful not to close the orifice of the ear with the syringe. If syringing fails, see a physician; no one else should attempt to remove anything from the ear with forceps, etc.

How is a foreign substance removed from the nostril?

The patient is made to take a deep breath and then close his mouth and pressing on the free nostril, blow his nose. If this does not answer, compression is made on the nostril above the object, and an attempt made to draw it out with a hairpin or bent wire.

What means is taken to remove a foreign substance from the trachea?

Striking the patient on the back between the shoulders. It is sometimes necessary to invert the patient while doing so; a child is generally held up by the legs, an adult is placed across a bed, couch, or chair, with his head and chest well over the edge.

What should not be done, and what should be done to remove foreign bodies from the alimentary canal?

Avoid producing vomiting or giving purgatives. Feed the person with such substances as bread and milk, mush, potatoes, for a day or two, after that, give a mild laxative.

How would you extract a barbed instrument, such as a fish-hook, from the flesh?

Push it sufficiently through to break off the head and then draw it back.

Fractures. Dislocations. Sprains. Strains.

Name the principal varieties of fractures and describe them.

Simple or closed, compound or open, complicated, comminuted, multiple, impacted, incomplete or greenstick. In a simple fracture the bone is completely severed, but there is no wound in the tissue that exposes it to the outer air. A compound or open fracture is one in which the tissues are injured and the fractured ends in communication with the air. A complicated fracture is one in which other injuries are present, either of a joint, nerve, vessel, etc., or wounds in the tissue which do not communicate with the point of fracture. A comminuted fracture is one where the bone is broken in several places and the fractures communicate. A multiple fracture is one in which, though the bone is broken in several places, the points of fracture do not communicate. An impacted fracture is one in which one fragment of bone is driven into the other. An incomplete or greenstick fracture is one in which the bone is bent or broken, but not entirely divided.

What are the symptoms of fracture?

Pain, swelling, discoloration, deformity, abnormal mobility, loss of power, crepitus.

How do fractures heal?

A mild inflammation takes place around the fracture in consequence of which excessive exudation from local blood-vessels occurs and callus is formed

between the broken ends and glues them together. After the bone is united the callus is absorbed.

What is understood by a fibrous union?

Union in which the fractured ends unite, but the callus fails to harden and remains as fibrous tissue.

Why must great care be taken in handling a simple fracture?

The ends of a broken bone are usually sharp, and are apt to protrude through the tissue and form an open fracture.

Why is an open fracture so much more serious than a closed one?

If the wound becomes infected, the consequent discharge may interfere with the union of the bone.

In what does the immediate treatment of a fracture consist, and what precaution against injury to the tissue must be taken?

In immobilizing the part by the application of a splint. The patient must not be moved until the part is splinted.

In an emergency, what can you use for a splint?

Any material that is sufficiently firm to afford support,—canes, umbrellas, firewood, barrel staves, pillows, etc.

How will you apply a temporary splint to a leg or arm?

Straighten the limb as much as possible, adjust the splint, secure it in place with a bandage, handkerchief, rope, or piece of clothing, etc. When the fracture is of the leg, if a wide splint cannot be obtained, it is well in addition to adjusting the narrow splint to tie the two legs together.

If you cannot get a doctor for several hours, what will you do to control the swelling?

Apply ice-caps or compresses wet in iced water or solution of lead and opium or arnica.

What is a Pott's fracture?

A fracture of the lower end of the fibula, complicated with dislocation of the ankle, and fracture of the inner malleolus.

What is a Colles's fracture?

A fracture of the lower end of the radius.

What will you do if you cannot get a doctor and you think the patient has a fractured skull?

Keep him as quiet as possible, apply ice-caps to the head, elevate the head of the bed, apply heat if the body seems cold, watch for twitching of the muscles, convulsions, paralysis; any change in the pupils; blood oozing from the mouth, nose, or ears; and keep such washed away.

What do the first four symptoms signify? What the last three?

Pressure upon some part of the brain. Fracture of the base.

What is a dislocation?

A complete separation or displacement of the articular surfaces of a joint, associated with more or less injury to the ligaments.

Should a nurse attempt to reduce a dislocation? What should she do?

With the exception of the jaw, a nurse should not attempt to do so if medical aid can be obtained within twenty-four hours. Keep the patient quiet and apply ice-caps or iced solutions, such as lead and opium or arnica, to control the swelling.

How is a dislocation of the jaw reduced?

The operator protects his thumbs and places them upon the last molar teeth on each side, grasping the

chin firmly between the fingers and thumbs; he then presses downward and backward on the jaw and at the same time pulls the chin upward.

What is a sprain?

A twisting or wrenching of a joint with tearing of the ligaments and surrounding tissues and, in a severe sprain, stretching of the neighboring tendons and muscles.

How should a sprain be treated until seen by a surgeon?

As a fracture. It should be immobilized, and either ice-caps or compresses wet with iced or very hot water, or a solution of lead and opium, or arnica applied.

What is a strain?

Wrenching or tearing of a muscle or tendon.

What is the immediate treatment of a strain?

The same as for a sprain.

Hemorrhage

(In addition to answering the following questions the pupils should be required to demonstrate the stopping of hemorrhage from all the larger arteries, and to show the points where compression should be made on the skeleton or manikin.)

What are the three varieties of hemorrhage, and how are they recognized?

Arterial—the blood is bright red in color and escapes in spurts; venous—the blood is a darker red and flows in a continual stream; capillary—the blood oozes from the cut surface.

How much blood is a person supposed to be able to lose without a fatal result?

Not more than one third of the amount in the body.

What are the symptoms of hemorrhage?

The pulse becomes rapid and feeble; the respirations shallow and sighing; the skin cold and pale, and covered with perspiration; the patient becomes restless, and complains of thirst and lack of air.

How does nature endeavor to arrest hemorrhage?

(1) When a vessel is severed, the muscular fibres in its wall contract and the wall retracts within its sheath and thus the calibre of the vessel becomes smaller at the point of injury. (2) When the blood comes in contact with the air it begins to coagulate and a clot is soon formed which occludes the opening. (3) The enfeebled action of the heart's beat favors the clotting of the blood and lessens the flow of blood to the part.

What are the means used to control hemorrhage?

Pressure, position, heat, cold, torsion, ligation, styptics.

How is pressure usually applied?

With the finger, compresses, or a tourniquet. It may be applied directly over the point of injury—direct pressure—or at a distance on the large artery supplying the part with blood—indirect pressure.

Would you make indirect pressure for arterial hemorrhage above or below the point of injury?

It should be made between the heart and the point of injury.

Where should indirect pressure for venous hemorrhage be made? Give reason for the second pressure.

First between the periphery and the wound, and then above the wound to prevent the engorgement of the veins or the entrance of air into them.

How long can the blood supply to a part be cut off without danger of gangrene resulting?

Not more than one hour.

What must be done if help cannot be obtained in that time?

From time to time, the tourniquet must be loosened sufficiently to allow the part to be supplied with blood.

How can you improvise a tourniquet?

Take a handkerchief, towel, or piece of any strong material; in the centre place a stone, or other hard substance; tie the handkerchief around the injured limb, having the stone directly over the course of the bleeding artery, or large artery supplying the part; slip a piece of stick, pencil, or like substance in the knot; and twist it until the tourniquet is sufficiently tight to arrest the hemorrhage.

Which of the other means of arresting hemorrhage should always be used in connection with pressure?

Position; the bleeding part must always be higher than the heart.

Where will indirect pressure be made for hemorrhage from the scalp?

On one or both of the temporal arteries.

For hemorrhage from the face?

On the facial arteries.

For hemorrhage from the neck?

On the carotid artery.

For hemorrhage from the shoulder?

On the subclavian artery.

For hemorrhage from the arm?

On the brachial artery.

For hemorrhage from the forearm?

On the brachial artery, or a pad can be placed in the

bend of the elbow and the forearm forcibly flexed on the arm.

For hemorrhage from the thigh?

On the femoral artery, either where it passes over the rim of the pelvis or at Scarpa's triangle.

For hemorrhage from the leg?

The same as for hemorrhage from the thigh, or on the popliteal artery by placing a pad behind the knee and forcibly flexing the leg against the back of the thigh.

For hemorrhage from the foot?

On the posterior tibial artery, for bleeding from the sole of the foot. On the anterior tibial for bleeding from the dorsal surface of the foot.

What will you do to arrest bleeding from the nose?

Keep the person quiet with the head high, never bent forward; apply cold to the back of the neck and bridge of the nose; compress the nostril between the thumb and forefinger. If these methods are not successful, spray the nose with an astringent solution; such as strong boiled tea, alum, or adrenalin 1:2000; pack the nostril with cotton, gauze, or soft linen.

What are the usual methods of checking persistent bleeding after the extraction of a tooth?

The application of ice or a plug of cotton or gauze; the latter is held firmly against the bleeding part by closing the jaws tightly. Styptics, especially iron, are used; also sprays of astringent solutions, such as adrenalin, strong boiled tea, etc.

How will you recognize hemorrhage from the lungs? (Hemoptysis.)

The blood will be frothy, due to the admixture of air.

What will you do to check it?

Keep the patient quiet, and give small pieces of ice by mouth. If the hemorrhage continues for a long time, bandage the extremities.

Why and how are the extremities bandaged during and after a hemorrhage?

During hemorrhage the extremities are bandaged to shut off the return circulation; because, by giving the heart less fluid to pump, its contractions are weakened and less blood is sent to the bleeding part. The bandages are applied beginning at the shoulders or thighs, working toward the periphery. One limb is always left unbandaged, and the bandages changed alternately, so that the circulation will not be cut off from any part longer than three quarters of an hour. After a hemorrhage, the blood is sometimes shut off from the extremities in order to give the heart a larger supply. In such case the bandages are applied in the opposite manner; *i. e.*, beginning at the hands and feet and working toward the trunk.

What will you do for hemorrhage from the stomach or intestines?

Keep the patient very quiet and give nothing by mouth until ordered by the doctor. If a doctor cannot be obtained for some time, an ice-cap can be applied to the abdomen.

What is the term used for vomiting blood?

Hematemesis.

What will you do to check uterine hemorrhage after labor?

Elevate the foot of the bed; knead the abdomen until the uterus contracts, then, grasp the fundus through the abdominal wall and knead it firmly; give about two drams of fluid extract of ergot and, if this treatment is not effectual, a hot (120° F.) saline

douche. If the bleeding still continues, pack the uterus tightly with sterile gauze (a nurse is only allowed to pack the uterus as a last resort, as, unless properly done, it is dangerous in the extreme). Treat for shock, but use no stimulants until the hemorrhage has been controlled.

What should a nurse do for hemorrhage from the umbilicus?

Make pressure over the point of bleeding, using a sterile compress, and notify the doctor. Styptics are often applied, but a nurse should only use such as a last resort, as their use is often followed by sloughing and other bad effects.

What is torsion?

Grasping a vessel with an artery clamp or forceps and twisting it around until the hemorrhage ceases.

What should be the temperature of hot water used to check hemorrhage?

120° F. to 130° F.

What will happen, and why, if the water is less hot?

The hemorrhage will be increased, because warm water will dilate the blood-vessels.

What does water 120° F. do?

It coagulates the albumen of the blood, thus favoring its clotting.

How does cold act?

It contracts the blood-vessels.

What are the symptoms of shock?

The same as those of hemorrhage, except that there is no escape of blood from the body, but, due to the depression of the nervous system, the blood-vessels are dilated and so much blood remains in the large internal vessels that the tissues are as truly deprived of it as though there had been a hemorrhage.

Mention a favorable symptom in shock and why it is favorable.

Vomiting; it shows that the nerve centres are not completely depressed.

Mention an important fact to remember regarding shock and its treatment.

After an accident, owing to excitement, the symptoms of shock may not at first be very apparent; therefore, after an accident of any severity a person should always be kept quiet and warm.

What treatment will you give for shock?

Loosen all clothing, elevate the foot of the bed, apply heat, and give plenty of fresh air. Stimulation is given if there is no hemorrhage. If there is hemorrhage it must be checked first.

Contusions. Wounds

What is a contusion?

A crushing of the tissues, usually without any breaking of the skin.

To what is the discoloration due?

To the escape of blood into the tissues.

What is the usual treatment for contusions?

In cases of severe contusion or with old people, heat is generally applied, either by the use of fomentations, or by wrapping the injured part in non-absorbent cotton and placing hot-water bags around it. When the contusion is not sufficiently severe to lower the vitality of the tissue to any great extent, cold is applied. When possible, the part is bandaged, as slight pressure furthers absorption of the exudate. Astringent applications, *e.g.*, lead-water, aluminium acetate, dilute vinegar, are often applied to relieve pain.

What is an incised wound?

One made with a sharp instrument, such as a knife.

What is a lacerated wound? A contused wound? A punctured wound?

A lacerated wound is one made with a blunt instrument or machinery; it is associated with tearing of the tissues. A contused wound is one in which there is more or less crushing of the surrounding tissue. A punctured wound is one produced by the thrust of a pointed instrument.

What must be remembered in caring for a lacerated or contused wound?

(1) That sloughing and infection are apt to follow, and that they, therefore, need to be very carefully cleansed. (2) When a wound is very badly contused the surrounding parts must be kept warm; otherwise, gangrene may follow.

What is a common complication of wounds caused by toy pistols? What precautions are necessary?

Tetanus. To cleanse the wounds thoroughly, when possible, using peroxid of hydrogen, and see a surgeon at once.

Why should a surgeon be consulted as soon as possible if a wound is of any depth, even if it has been caused by a sterile object?

Some of the tendons or ligaments may have been severed, and unless they are properly connected without loss of time, loss of function will follow; also, unless the severed edges are brought into apposition, an unsightly scar may result.

What is the rule to follow in "first aid" care of wounds?

If there is hemorrhage, control it; wash the surrounding skin with soap and water and a disinfectant. If the wound has been made with a sterile object,

bring the edges into apposition as well as possible and apply a sterile dressing. If the instrument causing the wound is unsterile, the wound must be irrigated and all foreign substances removed prior to putting on the dressing.

What do you understand by the expressions "healing by first intention" and "primary union"?

When the edges of the wound are brought into apposition and healing takes place without the formation of pus and with but little inflammation.

What is necessary to secure primary union?

The edges of the wound must be brought into apposition and the wound must be kept free from all infection.

When is a wound said to heal by second intention or "granulation"?

When, owing to infection or failure to bring the edges of the wound together, the wound is open and a greater amount of new tissue is needed in the process of repair.

Unconsciousness. Convulsions

What are the more common causes of unconsciousness?

Alcoholic intoxication, apoplexy, asphyxia, concussion of or pressure on the brain, convulsions, diabetic coma, epilepsy, hysteria, many forms of poisoning, shock, syncope, sunstroke, and uremic coma.

In examining a person whom you have found in an unconscious condition, what particulars will you note?

If there are any symptoms of convulsions; any signs of bruises or wounds of any kind; if there is an odor of alcohol to the breath; the condition of the

respiration, whether slow, fast, labored, or stertorous; if there is any frothing at the mouth; any appearance of swelling or edema; the condition of the pulse whether slow, rapid, full, etc.; of the eyes, whether the pupils are dilated or contracted, and if so if both pupils are similarly affected.

(a) *Does an odor of alcohol upon the breath necessarily mean that the person is suffering from alcoholic intoxication?* (b) *Why is this particularly apt not to be the case?*

(a) No. (b) A seizure of apoplexy, etc., is apt to be followed by a feeling of indisposition, to overcome which a person would be likely to take a dose of whiskey.

What are the symptoms of apoplexy?

The breathing is stertorous, and with each expiration there are a flapping of the cheeks, a puffing out of the lips, and sputtering from the mouth; the face may be either flushed or cyanotic; the pupils may be both dilated, or one be dilated and the other contracted; the pulse is full, hard, and slow; unconsciousness is complete—the patient cannot be roused; there is usually paralysis of one side of the body.

Until the doctor came, what would you do for a person whom you thought had apoplexy?

Loosen all clothing, elevate the head of the bed, apply heat to the feet and ice to the head.

What odors of the breath are of help in forming a diagnosis when the patient is unconscious?

An odor of urine indicates uremia, a sweet odor diabetic coma, an odor of alcohol might indicate alcoholic intoxication.

In what conditions would you be likely to find a pale moist skin?

Concussion of the brain, hemorrhage, shock.

What would you do for a person suffering from concussion of the brain until the doctor came?

Keep him flat on his back but with the head slightly raised, apply heat to the feet and cold to the head.

What would you do for a child with convulsions?

Put the child in a hot bath—112°F.—with ice on the head, give an enema, and, if possible, a dose of castor oil.

What would you do for a person with an epileptic seizure?

Keep him from hurting himself, but make no further attempt to restrain his movements; put something soft, as a towel, between his teeth to prevent his hurting his tongue; loosen his clothing.

What is the usual treatment for syncope?

Lay the patient flat on his back with his head lower than his feet; loosen his clothing; provide plenty of fresh air; cold water is often thrown in the face, and ammonia or smelling salts given by inhalation.

What will you do for asphyxia?

Remove the cause; give plenty of fresh air and, if necessary, artificial respiration; treat for shock.

Poisons

How are poisons classified according to their action?

As neurotics, irritants, and corrosives.

Mention the different classes of neurotics and their action.

Narcotics, which produce sleep; inebriants, which cause intoxication; anesthetics, which produce insensibility; depressants, which cause faintness or depression; convulsives, which cause convulsions.

Mention some of the more important poisons belonging to this class.

Aconite, belladonna, opium, alcohol, chloroform, hyoscyamus, strychnine, and poisonous fungi.

What is the effect of the irritants?

They produce inflammation of the tissues of the alimentary canal, and in some instances of the kidneys.

Mention some of the chief irritants.

Arsenic, antimony, cantharides, mercury, phosphorus, tainted foods.

What is the action of the corrosives?

They destroy all the tissue with which they come in contact; the symptoms of poisoning appear almost immediately and are promptly followed by collapse.

What poisons belong to this class?

Caustic alkalies, mineral acids, carbolic acid, oxalic acid, and corrosive sublimate.

What are the three things to be done in the treatment of poisoning?

Remove the poison, neutralize what cannot be removed, counteract the bad effects the poison has produced on the system.

How is the poison removed?

By giving lavage, or, if this is impossible, an emetic.

After what poisons should emetics not be given?

Emetics are not given after poisoning by strychnine or a depressant if any time has elapsed since the drug was taken, because there will be little left in the stomach, and emesis will increase convulsions or depression. Emetics are not given after poisoning by corrosives, for further corrosion of the tissues would occur during emesis.

What are the emetics most commonly used?

Mustard—one to two teaspoonfuls in a glass of

water; salt—two teaspoonfuls in a glass of water; ipecac—℥ xxx of the fluid extract. When no emetic is at hand, emesis is often produced by tickling the back of the throat with the finger.

What means do you take to neutralize a poison?

Give a chemical antidote; *i. e.*, a substance which will cause a chemical change in the nature of the poison, producing either an insoluble compound or one that is comparatively harmless.

Of what does the physiologic treatment usually consist?

In counteracting the effect the poison may have had on the system, for instance, on the heart, or, as in the case of opium, on the respiration, after corrosives; on the mucous membrane, after neurotics to prevent stupor or convulsions as the case may require.

What are the symptoms of, and treatment for, poisoning by mineral acids?

SYMPTOMS: In some instances, staining of the mouth and lips—nitric acid imparts a yellow stain, sulphuric acid a black stain; excoriation and inflammation of the mouth, esophagus, and stomach; intense abdominal pain; symptoms of shock; there may be vomiting and convulsions.

TREATMENT: The chemical antidote consists of an alkali such as chalk, lime-water, bicarbonate of soda, magnesia, whitewash, plaster from walls, soap. The physiologic treatment consists of demulcent drinks, as olive oil, castor oil, white of eggs; external heat, stimulants, if necessary.

What are the symptoms of, and treatment for, carbolic acid poisoning?

SYMPTOMS: White eschars on the lips; an odor of the acid on the breath, vomitus, and urine; excoriation and inflammation of the mouth, esophagus,

and stomach; shock; strangury; and sometimes retention of urine; dark and smoky urine.

TREATMENT: Chemical antidote; alcohol, sulphate of soda, lime-water, or syrup of lime. Physiologic treatment: milk, white of egg, external heat, stimulants, by rectum or hypodermic. Catheterize.

What are the symptoms of, and treatment for, poisoning by vegetable acids, as acetic, tartaric, oxalic?

SYMPTOMS: Pain in the mouth, constriction of the throat; shock; prostration.

TREATMENT: Chemical antidote; for acetic and tartaric, any of the alkalies used for poisoning by mineral acids; for oxalic, chalk or lime-water only. Physiologic treatment: same as for poisoning by mineral acids.

What are the symptoms of, and treatment for, poisoning by alkalies?

SYMPTOMS: Swelling of the lips and mouth, intense burning pain in the throat and abdomen, vomiting, dyspnea, shock.

TREATMENT: Chemical antidote; dilute acids, as lemon juice, vinegar, tartaric acid. Physiologic treatment: give whites of eggs, linseed oil, castor oil, or flour and water; apply external heat; give stimulants if necessary.

What are the symptoms of, and treatment for, poisoning by arsenic?

SYMPTOMS: Puffiness and itching about the eyelids; intense abdominal pain; hiccough; vomiting; bloody offensive stools, collapse, sometimes convulsions.

TREATMENT: Empty the stomach. Chemical antidote, freshly precipitated ferric oxide hydrated with magnesia or, if this cannot be obtained, magnesia alone may be used. Follow by large doses of castor

oil, olive oil, or sweet oil; heat to extremities; stimulants if necessary.

What are the symptoms of, and treatment for, belladonna poisoning?

SYMPTOMS: Dryness of the mouth and throat; flushed, dry skin; dilated pupils; the vision is sometimes double; vertigo; delirium; and, sometimes, convulsions.

TREATMENT: Emetic, lavage. Chemical antidote, tannic acid. Physiologic treatment: keep the patient quiet and warm. Give stimulants and artificial respiration if necessary. Physiologic antidote, morphine.

What are the symptoms of, and treatment for, chloral poisoning?

SYMPTOMS: The skin is cold; face livid; pulse and respiration slow; the pupils are at first contracted, but later become widely dilated; there is complete muscular relaxation; and coma.

TREATMENT: Empty the stomach. No chemical antidote. Physiologic treatment: keep the head low; apply external heat and counter-irritants, such as mustard, friction, electricity,—the patient must be kept awake; give strychnine and strong coffee.

What are the symptoms of, and treatment for, a too profound anesthesia, caused by chloroform, ether, or nitrous oxide?

SYMPTOMS: Loss of sensibility in the conjunctiva; dilated pupils; complete relaxation of the limbs; the respirations are embarrassed, the pulse is rapid, irregular and weak; the face cyanosed.

TREATMENT: Loosen all bands; keep the patient on his back with the head lowered; give plenty of fresh air; keep the tongue pulled forward and the throat free of mucus; perform artificial respiration; stimulate.

What are the symptoms of, and treatment for, poisoning by corrosive sublimate (bichloride of mercury)?

SYMPTOMS: Salivation; the lips and tongue are generally stained white; vomiting and purging; severe abdominal pain; shock.

TREATMENT: Wash the stomach. Chemical antidote: white of egg—one egg to every four grains of mercury. Physiologic treatment; demulcent drinks; external heat; stimulate if necessary.

What are the symptoms of, and treatment for, digitalis poisoning?

SYMPTOMS: The pulse at the wrist will be full and slow, though the heart will be beating rapidly; the eyes may be staring and prominent; and the sclerotics blue; there is intense headache; great prostration; there may be convulsions.

TREATMENT: Wash the stomach. Chemical antidote: tannin—a strong infusion of boiled tea can be used. Physiologic treatment: external heat; keep the patient very quiet, in the recumbent position; aconite is often used.

What are the symptoms of, and treatment for, opium poisoning?

SYMPTOMS: The respirations are very slow, noisy, and labored; the pupil contracted; there is intense drowsiness and, unless aroused, the patient gradually sinks into coma; the skin is moist, and pale or livid; there may be convulsions.

TREATMENT: Wash out the stomach repeatedly, even if the drug has not been taken by mouth, for it is excreted through the stomach and intestines; give potassium permanganate or tannin; strong coffee, either by mouth or rectum; keep the patient awake

by walking about, slapping with towels, etc.,—the stimuli must be varied; give artificial respiration, if necessary; atropin is sometimes given.

What are the symptoms of, and treatment for, poisoning by strychnine?

SYMPTOMS: Clonic convulsions; contraction of the mouth—risus sardonicus; eyes open and staring; inability to breathe; shock.

TREATMENT: Wash the stomach. Chemical antidotes: tannin, strong tea, charcoal. Physiologic treatment: keep the patient quiet, even a touch or a noise may start a convulsion; artificial respiration may be necessary, and inhalations of chloroform or amyl nitrate, to check convulsions and during treatment.

What are the symptoms of, and treatment for, poisoning by poisonous mushrooms?

SYMPTOMS: Colic, nausea, vomiting, diarrhea; weak, irregular pulse; labored respiration; the pupils at first are contracted, but later, become dilated. These symptoms are followed by great muscular weakness and collapse. There may be paralysis.

TREATMENT: Empty the stomach; apply heat to the stomach and feet; give large doses of castor oil; stimulate; atropine is often used.

What are the symptoms of, and treatment for, ptomaine poisoning?

SYMPTOMS: A few hours after taking the food there will be intense abdominal pain followed by purging; vomiting; faintness; cold, moist skin; muscular weakness; intense thirst; dilated pupils. There may be delirium or convulsions.

TREATMENT: Empty the stomach; stimulate; apply external heat, especially to the abdomen; later give large doses of castor oil.

What is the usual treatment for a person who has been bitten by a rabid animal?

Put a ligature above the part; apply cupping glasses over the wound; cauterize the wound; take patient as soon as possible to a Pasteur institute for inoculation with the specific antitoxin.

What is the usual treatment for poison from snake bites?

Put a ligature about the injured part to prevent the spread of the poison through the system. Loosen and tighten the ligature at intervals so as to prevent gangrene occurring and yet not allow much of the poison into the system at a time. It should be kept on until a cupping glass has been applied, and the wound cauterized and thoroughly washed and irrigated. Potassium permanganate is often used for the purpose; apply cupping glasses; cauterize.

CHAPTER IX

OBSTETRICS

Care in, Course and Complications of Pregnancy, Labor, and during Puerperal Period.

Pregnancy

What is understood by the term pregnancy?

The presence of an impregnated ovum within the body.

What name is given to pregnancy when the impregnated ovum remains in the Fallopian tube or escapes into the abdomen or pelvis instead of descending to, and remaining in, the uterus?

Ectopic or extra-uterine pregnancy.

What is the average duration of pregnancy?

280 days, but normal pregnancy may terminate in 270 days or continue for 300 days.

What is the usual method of predicting the date of labor?

Count back three months from the first day of the last menstruation and add seven days.

What are the usual symptoms of pregnancy?

Suppression of the menses; morning sickness, which begins about the sixth week and lasts about six weeks; enlargement of the breasts and, after the third month, they contain colostrum; pigmentation or coloring of the skin in various parts of the body especially in the areola of the breasts; enlargement of the abdomen; quickening—i. e., the first feeling of fetal life by the

mother—which usually occurs at or near the middle of the fifth month; the sound of the fetal heart-beat, heard, first, between the fourth and fifth months.

Where are the ova produced and retained?

In the ovaries. They are retained in the ovisacs (Graffian follicles) which are scattered throughout the ovaries.

What do you understand by the term ovulation?

The enlargement of the ova, bursting of the sacs in which they are contained, and their escape from the sacs.

What becomes of the ovum after it escapes?

It descends to the uterus and, unless it becomes impregnated, is discharged, usually at the time of menstruation.

What is the decidua vera?

The soft, spongy folds which form in the mucous membrane of the uterus at the time of impregnation.

What is the decidua serotina?

The part of the decidua vera to which the ovum becomes attached.

In what part of the uterus does the ovum generally lodge?

Near the openings of the Fallopian tubes.

What is it called for the first four months of its development?

An embryo.

What name is given to it after four months?

Fetus.

What is the chorion?

The shaggy, fringe-like membrane that forms the outer covering of the embryo, by means of which the latter clings to the wall of the uterus.

What is the amnion?

The inner membrane covering the embryo.

What name is given to the fluid secreted by the amnion, and what is its purpose?

The amniotic fluid. It facilitates the movement of the embryo during development; provides it with water; protects it from knocks the mother may encounter; helps dilate the internal os during labor and, when the sac ruptures, flushes out the parturient canal.

Of what use are the placenta and umbilical cord?

They constitute the nutritive and respiratory organs of the fetus, since it is in the placenta that the fetal blood, by osmosis, gets rid of waste matter from the fetus and obtains oxygen and nutritive substance from the mother's blood, and the blood flows from the fetus to the placenta through the umbilical arteries and returns by the umbilical vein.

What is the condition called when the placenta forms at the mouth of the uterus?

Placenta previa.

Why is this a serious condition?

The patient is apt to have a very serious, if not fatal, hemorrhage at any time during pregnancy.

What is the usual position of the child in the uterus?

The head lowermost, with the back turned toward the mother's left side, the feet and knees on her right side just above the middle of the uterus.

What are some of the complications to be watched for during pregnancy, and their causes?

Fecal impaction, due to pressure against the rectum by the uterus; pernicious nausea; toxemia, due to lack of elimination of the waste material of the body; albuminuria; eclampsia, which is generally due to either albuminuria or toxemia; hemorrhage, which may be

due to the placenta being situated at or near the mouth of the uterus, or to injury or rupture of the placenta; hemorrhage may also occur in the legs due to the bursting of veins which have become enlarged in consequence of pressure on those of the abdomen; abortion; miscarriage; mania.

Mention some symptoms of toxemia?

Headache, often of a neuralgic nature; general malaise; constipation; scanty perspiration and urine; coated tongue.

What symptoms precede eclampsia?

Headache, vertigo, dulness, and lassitude, dark spots or flashes of light before the eyes, edema of the face and extremities, melancholia, albumen, and casts in the urine.

To what is the treatment directed in both these conditions?

To the elimination of waste matter from the body; by keeping the skin, bowels, kidneys active, and to prevent an accumulation of waste, by restricting the diet.

What is generally understood by the terms abortion, and premature labor?

Abortion is the expulsion of a fetus which is not viable; labor is said to be premature when it takes place during the last three months of the natural term of pregnancy, but before its completion.

What are the symptoms of abortion?

Pain and hemorrhage.

What steps will you take to prevent a threatened abortion?

Notify the doctor, put the patient to bed, and keep her perfectly quiet, physically and mentally; apply a sterile vulva pad; elevate the foot of the bed, if there is much hemorrhage.

If the abortion takes place before the arrival of the doctor what should you do?

Keep the patient very quiet, in the recumbent position; sterilize my hands as for a surgical dressing, and then wash the patient around the vulva with boiled water or a disinfectant solution; apply a sterile vulva pad. Save all blood clots, etc., for the doctors inspection. These are best saved in cold water in a white vessel, as they can be thus more easily inspected. Watch for hemorrhage.

If a woman asked your advice as to what she should do, and not do, during the time of pregnancy what would you tell her?

(1) To see a doctor at least as early as three months; that, while she must not think too much of slight disorders or be worried by them, she should inform her physician of any abnormality in the urine, any tendency to continued nausea or severe headache; swelling of the legs; or bloody vaginal discharge. (2) That her diet should consist of light easily digested food, especially milk, eggs, fruit, and vegetables. That pastry and other rich food should be avoided, the amount of meat curtailed, also tea and coffee; that drinks containing alcohol should only be taken with a physician's permission. (3) That she should drink from one to two quarts of water daily; take measures to avoid becoming in the least constipated; take a warm bath daily; and have an abundant supply of fresh air, day and night. (4) That she should take as much exercise as possible without becoming fatigued. (5) That she should wear a waist, such as the equipose, instead of corsets; that her clothing should be warm, but not heavy, and must have no tight bands. (6) That she should avoid draughts,

over heated or crowded buildings, late hours, fatigue, and excitement.

Labor

What do you understand by labor?

The process by which the child and its appendages are removed from the mother.

What are the appendages?

The placenta, membranes, umbilical cord, and amniotic fluid.

What may result if any of the appendages are left in the uterus?

Sepsis or toxemia.

What is considered the first stage of labor?

The time from the commencement of the first regular contractions of the uterus until the os uteri is fully dilated.

What is the second stage?

The second stage commences when the os uteri is fully dilated and terminates with the birth of the child.

What is the third stage?

The time following the birth of the child until the removal or expulsion of the appendages.

Mention the usual symptoms of the onset of labor.

(1) Uterine contractions occur that increase in force and frequency and cause pains which, usually, begin in the back and pass to the abdomen; (2) the os dilates; (3) there is a bloody discharge called the show.

What care and treatment should the patient receive during the first stage?

Until the pains become severe and near together, she should be encouraged to walk about, as this

favors the descent of the child. But she must not be allowed to become fatigued, as, if labor is prolonged, she may become exhausted. As a further caution against fatigue she should be given nourishment every two hours; this should consist of food that will leave little residue; such as, chicken broth, beef tea, and other meat broths. Also, if the labor continues over night and the patient does not get sufficient sleep, the doctor should be notified. An enema is given in the beginning of labor, and the patient should be encouraged to pass urine frequently. Should it be necessary to catheterize her, a rubber cathether must be used. The external genitals must be kept clean by sponging frequently with sterile water, using sterile cotton or wash-cloths that have been boiled. The patient should be cautioned against bearing down during this stage. When the membranes rupture she should be put to bed, a sterile pad put on, and the doctor notified.

(a) *What danger attends prolapse of the cord? (b) What should a nurse do if it emerges from the uterus?*

(a) Pressure on the cord; this deprives the child of blood and thus of oxygen. (b) Notify the physician and place the patient in the Trendelenberg position. If the doctor does not come the nurse should scrub and disinfect her hands thoroughly and push the cord far enough up into the uterus to relieve all pressure on it. Afterward, the patient can lie on her back with her hips elevated, but care must be taken when moving her or the cord will fall again.

What should the nurse be ready to do as soon as the head is born?

Cleanse the eyes and mouth of all mucus and discharge.

How are the eyes treated?

A drop of either 2% nitrate of silver, protargol 5%, or argyrol 10% is generally dropped in each eye and afterward a few drops of salt solution; any discharge is carefully washed off with boric acid or salt solution.

Mention some forms of treatment resorted to when a child does not breathe properly after birth?

The infant is held up by its feet and slapped on its back and chest. A finger is inserted to the back of its throat to remove any blood or mucus that may be there. Gauze is put over the child's mouth, and the physician, putting his mouth over the infant's, blows forcibly down the latter's throat. The child is put into a hot bath and, sometimes, alternately, into a hot and a cold bath. Artificial respiration is performed—a method commonly used is to grasp the child under its back with one hand and, with the other hand, hold the thighs and alternately flex them on the chest and extend, about sixteen times in a minute; unless the infant is in the warm bath while this is being done, it is usually held with its head downward.

What care is given the infant after it is resuscitated?

It is anointed with oil, to soften the vernix caseosa, rolled in a blanket, and put in a warm place; later, it is bathed, its eyes and mouth washed, its cord dressed, and it is clothed. It is put to the breast four hours after birth and every four hours afterward.

What are the chief deviations from the normal in premature infants? What care do these abnormalities demand?

Low temperature and inability to take and digest food properly. The child must be kept warm; handled as little as possible; anointed with oil, instead of

bathed; fed very slowly by means of a medicine dropper or Breck feeder.

Upon which side is a new-born infant to be laid? Why?

Its right side. This position is thought to favor the closure of the foramen ovale and the flow of blood from the ascending vena cava into the right auricle.

What is meant by the puerperium?

The period (about six weeks) following delivery during which the uterus is returning to a state similar to that before impregnation.

What is lochia?

The discharge from the uterus which follows delivery and is present for about fourteen days. For the first five days it, normally, consists principally of blood, but it gradually becomes serous in character and contains degenerated epithelium, mucus, micro-organisms, and, after a time, pus from the granulating wounds of the uterus.

When must special watch be kept for hemorrhage?

After protracted labor; when the patient is in ill health; if pieces of placenta, etc., have been retained.

What are the symptoms of hemorrhage?

Growing pallor; sighing respiration; thirst; air hunger; restlessness; rapid compressible pulse.

What must be done in order to avoid hemorrhage?

The hand should be kept over the fundus of the uterus, and if the uterus tends to relax, it must be grasped through the abdomen and kneaded with sufficient force to cause contractions.

If a binder is applied, where would you begin to pin it and why?

At the top. The uterus is to be brought downward and forward against the rim of the pelvis and if the

binder is fastened from below upward it is apt to push the uterus upward.

What should a nurse do in case of post-partum hemorrhage?

Send for the doctor; elevate the foot of the bed, knead the abdomen until the uterus contracts, then grasp the fundus through the abdominal wall and knead it firmly; give about two drams of fluid extract of ergot, and, if this is not effectual, a hot (120° F.), sterile saline douche. As a last resort, she can pack the uterus very tightly with sterile gauze.

What precautions must be taken when giving a douche after labor?

(1) Everything used must be absolutely sterile. (2) No air must be introduced into the uterus or a serious accident might follow; therefore, (a) the air must be expelled from the tube by letting water run through it before inserting it; (b) the amount of solution in the irrigator must be carefully watched and the douche discontinued before all the solution escapes.

What are the complications to be watched for during the puerperal period?

Sepsis or puerperal fever, puerperal mania, abscess of the breast; thrombosis of the legs.

What are the symptoms of sepsis?

Chill, rise of temperature, rapid pulse, tenderness of the abdomen, changes in the amount and odor of the lochia.

Of what is sepsis the result?

If the labor has been normal, sepsis is the result of lack of asepsis during or after labor, retention of membranes, or absorption of lochia.

What particulars should be noted and reported regarding the lochia every time the vulva pads are changed?

Its increase or decrease, color, and any change in the odor.

What precautions will a nurse take against sepsis after labor?

Always wash and disinfect her hands before doing the patient's dressing, *i. e.*, cleansing the external genitalia and surrounding parts and changing the vulva pad; use sterile gauze or cotton and a warm sterile disinfectant for cleansing; do the dressing every three hours for the first twenty-four hours and after that every four or six hours; scald or otherwise disinfect the bed-pan before use; use sterile vulva pads and see that they remain in position; sterilize all utensils and solution used for douching.

What is the usual cause of breast abscesses?

Lack of cleanliness in the care of the nipples; either, they are not washed before and after the child nurses, or the nurse does the washing without cleansing and disinfecting her own hands. Caked breasts and cracked or fissured nipples are predisposing causes.

How should massage be given to the breast?

The nurse should first wash and disinfect her own hands and the patient's breast, then, with the tips of her fingers, rub the breast gently from the outer border toward the nipple; at the same time, drawing the breast toward the median line. After doing this for about five minutes, she should give a gentle kneading beginning at the base of the breast and working toward the nipple. If the massage causes acute pain, it should be discontinued until the fact has been reported to the doctor. The doctor states the length of time he wishes the massage given.

How can depressed nipples be drawn out?

With a heated bottle. The bottle is filled with

boiling water; in a few seconds the water is poured out and the bottle placed, quickly, over the nipple.

What are the primary symptoms of puerperal thrombosis of the lower extremities?

Pain in the brim of the pelvis, and a feeling of weight and stiffness in the leg followed by swelling.

(a) *What is a most important point in the nursing?*

(b) *Why?*

(a) To move the leg with the greatest of care and as little as possible. (b) The clot may become dislodged and carried to the heart and so cause instant death.

What name is given to the operation when the child is delivered: (a) by abdominal section? (b) When the pubes is divided? (c) When the child's skull is crushed?

(a) Cesarean section. (b) Symphysiotomy, or pubiotomy. (c) Craniotomy, or embryotomy.

What special care is required in nursing patients after symphysiotomy?

The patient must be kept on her back and very quiet; the greatest care must be taken when changing the under sheets not to turn her or to do anything to move the pubic bones; the strapping and binder used to keep the bones in apposition must be watched constantly, that they do not become displaced.

CHAPTER X

CARE OF CHILDREN

Care of the Infant after Birth. Care of Children. Normal Rate of Development.

What temperature would you have the water for a baby's first bath, and how would you give the bath?

100°F. The bath should be given in a warm, draughtless room—72° F.; the child should be held in the lap, which is covered with a rubber, that, in turn, being covered with a warmed, soft blanket; the latter is kept around the child while it is being bathed. The child is carefully bathed, first with castile soap-suds and then with clear water, all sebaceous matter being removed; if, in places, this is so adherent that its removal may entail injury to the skin, a little vaseline or oil should be rubbed into it. After washing, the child must be thoroughly dried by patting with a warm towel.

Mention some points to remember about the cord and describe the first dressing.

The cord must be handled as little as possible; it should lie in the position in which it naturally falls. After the bath, the cord and surrounding skin are washed with an antiseptic solution and then dried by patting with sterile absorbent gauze. A pad of three or four thicknesses of gauze, with a hole in the centre, is slipped over the cord and its ends wound around it. The dressing is secured in place with a sterile binder. This binder must only be applied with

sufficient firmness to keep the dressing from slipping; it is better sewn than pinned. Unless the dressing becomes wet, it is generally not removed until the fifth day, when the cord, if in good condition, usually drops off. Powder is sometimes put on the cord; when it is, it must be first sterilized.

What care should a baby's eyes receive?

For the first few days after birth, they should be washed with boric acid solution, 2% twice a day, or oftener if there is any discharge. The eyes must at all times be kept clean. Any appearance of discharge or of irritation of the lids should be reported to the doctor.

What care should be given a baby's mouth?

It should be washed twice a day with boric acid solution 2%, using absorbent cotton, never gauze, for a washer. If washing twice a day is not sufficient to keep the mouth clean, it must be done oftener. If the infant is being fed from a bottle, it is well to dip the nipple into boric acid solution before giving it to the child, as this will help to clean the mouth, just as does washing the mother's nipple before she nurses the infant.

What care is necessary to prevent irritation of the infant's buttocks?

The diapers should be changed as soon as they become wet or soiled, after a defecation; the buttocks should be washed with warm water and soap; diapers that have been wet with urine should never be re-used until they have been, at least, rinsed in warm water; the diapers of a baby suffering from any intestinal complaint should be put into a disinfectant immediately upon removal, and should be boiled before being re-used; the nurse should wash and disinfect her hands

after changing such diapers. Diapers should always be made of a soft absorbent material, and should be so adjusted that there will be no wrinkles or creases.

How is it well to arrange a child for an enema?

It is generally necessary to give an enema with the child in the dorsal position and the bed-pan under it, or else to hold it, on its side, on the lap, which is protected with a rubber, one end of which is pinned about the child's waist and the other falls into a pan.

What should be the temperature of a cleansing bath for a child under three months? Between three months and one year?

95° to 100° F. 90° to 96° F.

For a child of two years?

75° to 80° F.

How will you take the temperature of a child, and what will you do if it struggles?

By rectum. Turn it face downward, or hold it face downward across my knees.

Stools and Urine

Mention the name and nature of the first intestinal discharge after birth?

Meconium. It is tenacious in character and of a dark greenish color.

How soon should the character of the stools change?

By the fifth day their character should be entirely changed.

What should be the character of the stools after the fifth day?

The stools of a breast-fed child should be a soft semi-solid, of a deep yellow color; those of a child fed on cow's milk are often bulkier and of lighter shade.

How many movements should an infant have a day?

There should be from four to six until the end of the second week after birth, the number should then gradually decrease until the end of the first month when the number should average about two a day.

Why is it so necessary to watch for any abnormal conditions in the stools?

Abnormal conditions of the stools are frequently one of the first indications of errors in diet or of gastro-intestinal disturbances or disease.

Mention some abnormal conditions of the feces and their significance?

(1) Blood in the feces; if bright red it shows that the bleeding is in the lower part of the bowel; this is often due to the passage of hard masses of feces or lumps of casein, or of irritation in the rectum or lower part of the intestine. Dark clotted blood or blood mixed with feces indicates that the seat of hemorrhage is high up in the bowel. Blood in the stools is one of the symptoms of enterocolitis. (2) Mucus in the stools indicates catarrhal inflammation; when the mucus is in shreds or masses, it shows that the trouble is in the lower part of the intestine, when it is mixed with feces, it means that the irritation is in the upper part of the bowel. (3) Stools that are green when passed, indicate fermentation which is usually the result of bacterial action, but is sometimes due to a diet too rich in sugar. Even normal stools will sometimes become green on exposure to the air. (4) Yellow, watery stools; these are generally due to a depressed nervous condition and indicate a relaxed condition of the bowel; they are especially common in summer. (5) Very foul stools indicate decomposition in the intestine. (6) Curds in the

stools; if these curds are soft and yellow, they indicate too much fat in the diet, if firm and hard too much casein.

What is the average quantity of urine passed daily by a healthy child?

About 2 ounces during the first twenty-four hours.

About $\frac{1}{2}$ to 3 ounces during the second twenty-four hours.

About 3 to 8 ounces daily from the third to the sixth day.

About 5 to 13 ounces daily from the seventh day to the third month.

About 7 to 16 ounces daily from the second month to the sixth month.

About 8 to 20 ounces daily from the sixth month to the second year.

About 16 to 26 ounces daily from the second to the fifth year.

When the urine stains the napkins, what is generally indicated?

That there is an excess of urea in the urine. In infancy, this is usually due to defective metabolism.

How can you get a specimen of urine from an infant?

In a male baby, place the penis in the neck of a small bottle and bind the bottle in place. For a female baby place a small pan or kidney basin under the buttocks, protect the edges of the pan with pads, and put a pillow under the upper part of the baby's body.

Development of Children

Mention some things that show if a child is developing normally.

Its increase in stature, in weight, its mental development, and normal dentition.

What is about the average length of a child at birth?

A male child, $19\frac{1}{2}$ to $20\frac{1}{2}$ inches, a female child, 19 to 20 inches.

About how much should a child grow during the first month?

$1\frac{3}{4}$ inches.

About how much should a child grow during second month?

$1\frac{1}{2}$ inches.

About how much should a child grow during the first year?

8 inches.

About how much should a child grow during the second year?

$3\frac{1}{2}$ inches.

What is the average weight of a child at birth?

6.6 to 8.8 pounds.

About how long should it take to double its weight?

To treble it?

A healthy infant usually doubles its weight in five months and trebles in fifteen or sixteen.

What should be about the average gain per day during the first five months?

$\frac{2}{3}$ of an ounce to 1 ounce.

What should be the average daily gain from 5 months to 1 year?

$\frac{1}{3}$ to $\frac{2}{3}$ of an ounce.

Is the increase in weight always exactly regular?

No, it seldom is, sometimes for several days there will be little gain, but, on the whole, if a child is healthy, the average at the end of a week or so will be correct.

Mention something that will make a child gain in weight when it is really not developing in all respects as it should.

When a child is given too much carbohydrate food.

Give the order in which the milk teeth usually appear.

Lower central incisors at 6-9 months	Upper incisors at 8-12 months	1st molars and lateral incisors at 12-15 months	Canines at 18-24 months	2d molars at 24-30 months
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When should the teeth begin to come through the gums, and at what age is the first dentition usually completed?

The first teeth usually begin to come through the gums about the sixth or seventh month, and are all through by the end of infancy, *i. e.*, two and one half years or three years.

When does the eruption of the second teeth usually begin, and in what order do they appear?

5 to 7 years. They appear as follows:

	Incisors		Bicuspid				
	Central	Lateral	First	Second			
First molars at 5-6 years	at 7 years	at 8 years	at 9 years	at 8 years	Canines at 12-14 years	2d molars at 12-15 years	3d molars or wisdom at 17-25 years

Mention diseases that are likely to affect the teeth, and state in what way they are affected.

Rickets is apt to make the teeth brittle and furrowed; syphilis, to cause the condition known as Hutchinson's teeth, *i. e.*, they are pegged and small

and the central incisors have a crescentic notch in the centre of their edge; diphtheria and other of the infectious diseases, if had at an early age, may cause laminated or pitted teeth.

How soon will a healthy infant usually begin to show that it recognizes objects?

About the fifth month.

Until what age should a child be prevented from walking?

Until nine months old.

Why?

Until that age the bones of its legs are seldom strong enough to support its weight without becoming bent.

At what age does a child generally begin to talk?

At the end of the first year.

What are the more common causes for an infant's failing to talk at that time?

Tongue-tie, adenoids, enlarged tonsils, lack of intelligence, illness, but occasionally perfectly healthy and intelligent children are, for no apparent reason, very backward in talking.

CHAPTER XI

DISEASE

Symptoms of, and Nursing in the More Common Diseases.

Inflammation

What are the causes of inflammation?

(1) Infection by certain organisms; (2) injury to the tissues such as occurs with wounds and fractures; (3) chemical irritation, as that produced by strong acids, alkalies, and various poisons; (4) mechanical irritation, as that produced by excessive heat, cold, friction, etc.

What are the symptoms of inflammation?

Redness, heat, swelling, pain, and impaired function in the injured part.

Describe the phenomena of inflammation.

Irritation in any of the tissues, by its influence on the nervous system, results in an increased flow of blood to the affected part; *i. e.*, there is congestion. If the irritation is severe or long continued, the circulation on the part begins to slacken and an unusual amount of blood plasma, many leucocytes, and a few red corpuscles pass from the vessels into the tissues and the liquid becomes more or less clotted and hardened. If the inflammation is due to the presence of foreign substances, as bacteria, the leucocytes project their protoplasm around, and endeavor to demolish, them. If the leucocytes succeed, the irritation ceases; the hardened exudate within the tissues

is liquefied by a ferment set free from leucocytes that were broken down in the struggle; the excess liquid is absorbed by the blood; the circulation in the part improves and the inflammation consequently subsides. If the bacteria are the victors, the tissue of the affected part becomes softened and disintegrated by the ferment set free from the dead leucocytes and a thick, yellow liquid known as pus is formed. Pus consists chiefly of blood-plasma, a few red corpuscles, many leucocytes, disintegrated tissue, dead and living bacteria, and toxins produced by the bacteria.

What are the names given to these two terminations of inflammation?

(1) Resolution; (2) suppuration.

(1) What is the name of the class of leucocytes which protect the body from bacteria? (2) Mention some other substances in the blood that help protect the body from infection?

(1) Phagocytes. (2) Opsonins and antitoxins.
(See pages 120, 238.)

Fever

Mention some important conditions that protracted high fever will cause in the body.

There is increased tissue waste, which results in emaciation; the secretions of the alimentary canal are lessened; the urine is likely to be scanty and on account of excessive tissue waste will contain an unusual amount of solids and be dark colored; there is an abnormally rapid destruction of red blood corpuscles and consequent anemia.

Mention one theory of a common cause of fever.

The nerve centers which maintain the normal

balance between the production and elimination of heat are depressed by toxins circulating in the blood. These poisons may be due to bacterial infection, faulty metabolism, or injury to the tissues.

How does fever terminate? Define the terms.

By crisis—*i. e.*, the temperature falls suddenly; or lysis—*i. e.*, the temperature falls gradually.

Mention some important measures to be observed in the care of fever patients, and state why they are necessary.

(1) They should be kept quiet and spared all unnecessary exertion because if the fever is long continued or due to the toxins of bacteria, the heart will be affected and even slight exertion or an upright position increases its work. (2) Causes for excitement should be avoided as excitement is one cause of delirium. (3) Fresh air, cool if possible, should be provided, for it prevents restlessness, is tonic and essential for many reasons, but draughts must be avoided or the patient may be chilled, and chilling will, by contracting the superficial blood-vessels, drive the blood to the interior of the body and cause congestion of the internal organs. This may result in nephritis or other trouble. (4) Cold baths are given for: (1) they act as both nerve tonics and nerve sedatives; (2) they stimulate the circulation and thus (*a*) relieve internal congestion; (*b*) they tend to lessen the fever; (*c*) they improve the condition of the skin and thus decrease the danger of pressure sores. (5) A liberal supply of water is very important: (*a*) to supply water to the tissues; (*b*) to wash waste matter from the system; (*c*) to flush the kidneys and dilute the irritating poisons they must eliminate. (6) Sufficient easily digested food must be given (page 322); (7) The mouth is washed after every feeding to keep it

free from sordes and so prevent ulceration of the gums, infection of the ear, etc., and, after cleansing, a lubricant is used to prevent the mucous membrane becoming dry and cracked. (8) If the fever is of an infectious nature, the mouth must be cleansed before feeding as well as after. (9) Attention must be paid to the disinfection of excreta, utensils, etc. (see pages 211, 212, 213).

Bacterial Diseases

Of what is disease the result?

Either of germ invasion or of abnormal changes generated within the body as a natural sequence to irritation, debility, or of degeneration resulting from either inherited or acquired weakness.

What is the name given to diseases due to germ invasion?

Infectious diseases.

What is usually understood by the term contagious diseases?

Those which are readily communicable, and which can be contracted by coming within a certain radius of the patient, as well as by touching anything which has been in contact with the patient and not properly disinfected.

What is the term used for those contagious diseases which are characterized by a characteristic eruption?

Exanthemata.

Name and define the stages in infectious diseases.

(1) Incubation, the period between the time of exposure to the disease and appearance of the symptoms. (2) Invasion, the appearance of the active symptoms. (3) The febrile or active stage. (4)

Defervescence. In the exanthemata, there is also the eruptive stage which begins shortly after the invasion, and the stage of desquamation which usually follows the active or febrile stage.

Why are there few, if any, symptoms of a disease during the period of incubation?

Many of the symptoms are due to toxins produced by the bacteria and it takes some time—the length of the period of incubation—for these to be formed in sufficient quantity to produce the symptoms.

What is meant by a self-limiting disease?

One from which the patient recovers if, and when, his body produces sufficient antitoxins to neutralize the toxins produced by the bacteria.

How do organisms which cause communicable diseases gain entrance to the body?

(1) Through the mouth, with food and drink, or by being inhaled with dust, or by the use of infected cups, towels, etc. (2) By injection under the skin by infected mosquitoes—*e. g.*, malaria and yellow fever—or the bites of rabid animals—*e. g.*, hydrophobia. (3) Through abrasions in the skin or mucous membrane—*e. g.*, erysipelas, tetanus, septicemia.

State the period of incubation in the following five diseases.

Scarlet fever, a few hours to a week.

Measles, about two weeks.

Rubella, about two weeks.

Variola, from seven to twenty-one days.

Varicella, one to two weeks.

How soon after the invasion does the rash appear in the above diseases?

Scarlet fever, end of first or beginning of second day.

Measles, on the fourth day.

Rubella, on the first or second day.

Variola, on the third or fourth day.

Varicella, on the first day.

Scarlet Fever

Describe the rash of scarlet fever, its manner of spreading, duration, and the duration of desquamation.

It is scarlet red, punctiform, diffuse, and disappears on pressure. It appears first on the neck and chest and spreads rapidly over the entire body, with the exception of the chin and outside of the lips which are rarely involved. It often appears in the pharynx. It persists for four or five days and is followed by desquamation which continues for one to three weeks.

Mention three symptoms of scarlet fever other than the rash, and describe them.

(1) The manner in which the disease begins, which is, either, with a chill or with vomiting and convulsions. (2) The appearance of the throat,—there are fulness and tenderness beneath the jaw, enlargement of the lymphatic glands, and consequent difficulty in swallowing. (3) The condition of the tongue,—at first, it is heavily coated, except at the tip and edges; in a few days, the coating almost entirely disappears and the papillæ become swollen and bright red.

Mention some important adverse symptoms to be watched for when nursing scarlet fever, and their significance.

Decrease in the amount of urine voided, edema, a rise of temperature after the beginning of convalescence, nausea, or vomiting—these symptoms may all indicate an attack of acute nephritis; pain in the ear, which may mean otitis media; increase of tempera-

ture and rate of respiration, which point to pneumonia; adverse changes in the pulse, which may indicate cardiac complications.

What are the special points to be considered in the nursing of scarlet fever, and why are they of importance?

To give water freely, to avoid a toxic condition and flush the kidneys; to watch for, and report, any change in the urine—nephritis is one of the most common complications; to keep the mouth free of sordes to prevent infection of the middle ear and consequent deafness—another frequent complication; to anoint the skin daily, in order to avoid the dissemination of scales of desquamation; to be particularly careful in the disinfection of the hands, of all utensils and clothing used by, or in the room with, the patient, and, at the termination of desquamation, of the room, its contents, the patient, and personal clothing, body, and hair. Scarlet fever is one of the most transmissible of diseases.

State at what period of the disease it is contagious; where the germ is; and if it is long or short lived.

Scarlet fever is probably contagious at all stages. The specific micro-organism is supposed to be in the desquamated epithelium and in the secretions of the throat. The germ is very long-lived and hard to destroy; clothing worn by a scarlet-fever patient has been known to cause infection months later.

Measles

What are the symptoms of measles, in addition to the rash?

The presence of small bluish-white spots surrounded by red areola on the mucous membrane of the cheeks

and lips a day or two before the skin eruption, coryza, sneezing, cough, and thin nasal discharge.

Describe the rash of measles, its duration, its manner of spreading and disappearing.

It consists of red elevated spots that tend to coalesce into groups with crescentic borders. It appears successively upon the chin, forehead, sides of the throat, face, and chest. It persists for from two to five days and then fades in the order of its appearance, and is followed by a fine mealy desquamation that will continue for a week or more.

What are the special points to be considered in the nursing of measles?

To avoid draughts, to cleanse the mouth before and after feeding, to cleanse the eyes of all discharge and shade them from a strong light, to bathe and anoint the skin daily to prevent itching, to disinfect carefully—measles is highly contagious.

In what is the contagium supposed to be contained?

In the nasal and bronchial secretions.

What are the more common complications of measles?

Broncho-pneumonia, conjunctivitis, otitis.

Rubella

What is the other name for rubella, and what are the symptoms?

German measles. The symptoms are much the same as those of measles in a mild form, but the rash never takes a crescentic form, and it appears about the second day, first around the ears and mouth. Also there is enlargement of the cervical glands.

Chicken-Pox

What care is necessary in rubella and chicken-pox?

The patient should be kept quiet, in a warm well-aired room, not necessarily in bed, unless there is a rise of temperature. In chicken-pox the skin should be anointed daily, to prevent itching, and, if necessary, mittens put on the hands or splints at the elbow, to prevent scratching.

What degree of isolation and disinfection is necessary for these two diseases?

The patient should be kept in one room and away from children, all dishes and utensils used by him should be kept separate and washed separately. It is well to let clothing stand in a disinfectant for a few hours before sending it to the laundry. At the close of the disease, the room should be well aired and the sun allowed to shine into it for several hours.

Diphtheria

What is the exciting cause of diphtheria, and where is it found?

Klebs-Loeffler bacillus. It is found in the affected mucous membranes, occasionally in the blood and distant organs.

Is diphtheria as contagious as scarlet fever and measles? How can danger of contagion be avoided?

No. As the germ is very rarely present except in the affected mucous membrane, there is very little danger of contagion if all discharges from the throat and nose are carefully received into gauze, paper, or other handkerchiefs that can be burned immediately and the usual rules of isolation adhered to.

What special precaution against personal infection should the nurse take? Why?

When irrigating the throat she should wear glasses to protect her eyes and a gauze handkerchief in front of her mouth; because the patient is apt to expectorate violently during the process.

What are the chief points of difference between diphtheria and tonsillitis?

In diphtheria the membrane is of an ashy-gray color; is not readily detached, and, if removed, leaves a bleeding surface; as a rule it does not remain limited to the tonsils, but rapidly spreads to the uvula, pillars, and pharynx. In tonsillitis the exudate is of a yellowish-white color, it is confined to the crypt of the tonsils, and is fairly easily removed.

Is it safe to place implicit faith in these differences?

No, diagnosis can often only be made after microscopical examination.

Mention the special adverse symptoms that a nurse must watch for in diphtheria, and their significance.

Hoarseness, croupy cough, progressive dyspnea, which may indicate diphtheritic croup; abnormal changes in the pulse, such may indicate heart failure, a frequent complication; pain in the ear, this may show otitis, another frequent complication; regurgitation of food, which is the premonitory symptom of paralysis of the muscles of deglutition.

Mention some important particulars in the nursing of diphtheria and state why they are necessary.

To give all the water possible; to keep the skin active; to report to the physician if the bowels do not move well daily—diphtheria generates a very toxic condition in the system, and all means must be taken to eliminate the poison through the excretory organs; to keep the patient very quiet, in order to lessen the danger of heart failure; to give sufficient nourishment.

How is a patient fed after intubation?

The patient must be placed with the head lower than the body. When feeding an adult the foot of the bed can be raised and a small pillow placed under the shoulders and neck. A child is best held in the nurse's lap with its head dropping beyond and supported by her arm.

Erysipelas

To what is erysipelas due?

To infection by the *streptococcus erysipelatis*.

How does the germ gain entrance to the body?

Through abrasions or wounds in the skin or mucous membranes.

What are the principal symptoms of erysipelas?

There is generally an initial chill, followed by a high temperature, and the tissues of the affected part become swollen and red with a strong line of demarcation around the inflamed area.

Why, in a surgical ward, is it very important that this condition should be recognized at once?

Wounds are very easily infected with the disease.

Gonorrhea

What is gonorrhea, and what are the more common seats of infection?

An acute, highly infectious, virulent process due to infection by the *gonococci*. The urethra and vagina and the structures in anatomical relation with them, and the eyes are the parts most commonly affected.

If you found that a child had a vaginal discharge, what would you suspect and do?

That it might be gonorrheal vaginitis. Notify the doctor, and, until he gave orders to the contrary, keep the child, so far as possible, away from other children, prevent it using the regular toilet, and isolate and disinfect all utensils used by it and also everything used for local treatment; disinfect or boil all under-clothing and bed-clothes; disinfect and wash my hands after cleansing the child locally; use gauze or other cloths that can be burned for such cleansing.

Mention some important points to remember in the care of a case of gonorrheal infection of the eye.

That in such cases, only the most unremitting care will save the sight. If compresses are ordered they must be changed about every two minutes, the same compress never being used twice; the eye must be irrigated and cleansed sufficiently often to prevent pus accumulating around the eyeball; in cleansing only the softest material, such as absorbent cotton, must be used; if only one eye is affected, the well eye must be carefully shielded to prevent it becoming infected.

Describe the usual method of shielding the eye in such cases.

A watch crystal, about $1\frac{1}{2}$ inches in diameter, is fastened over the eye by means of two pieces of adhesive plaster, one $2\frac{1}{2}$ and the other 2 inches square, with a hole one inch square in the centre of each. The smaller piece of plaster is stuck to the concave side of the crystal, and the larger to its convex surface, the two gum surfaces of the plaster facing. The upper piece being larger extends beyond the under and is fastened to the face except on the temporal side, where the plaster is cut to prevent its sticking, so that the eye may have ventilation.

Malaria

What is the cause of malaria, and how is it transmitted?

The *plasmodium malariae*, a unicellular animal. Malaria is transmitted by a species of mosquito, the *anopheles*.

After entering the blood, what do the malarial organisms do, and at what stage of their action does the patient have a chill?

After entering the blood, the malarial organisms make their way into the red blood-cells; each one takes possession of a different corpuscle and feeds on its hemoglobin. After the parasite grows to maturity it splits up into a number of small parasites, which break out of the corpuscle into the blood, where they remain for a short time and then enter other red blood-corpuscles and the cycle is repeated. It is when the parasites break loose that the chill occurs.

What are the special particulars to consider in nursing malaria?

To apply external heat during the chill, to do everything possible to insure comfort and coolness during the subsequent high temperature; to screen the patient *carefully* with a mosquito-net in order to avoid the infection of others.

Meningitis

What are the special points to be observed in nursing patients with meningitis?

To keep the patient very quiet, in a cool, dark room; to burn or disinfect all discharges from the throat or mouth and also the handkerchiefs or utensils used for their reception.

Rheumatism

Mention some important points to remember when nursing patients with acute rheumatic fever.

(1) Some form of heart disease is very apt to follow rheumatism; therefore, as a preventative measure, the patient should be, as far as possible, spared all exertion and excitement. (2) Rheumatism is a most painful affection and, therefore, particular care should be observed in moving the patient and, in most cases, it is necessary to provide means to prevent the weight of the bed-clothes resting on the affected parts. (3) Excessive perspiration is one of the features of the disease, the sick-room must therefore be warm, *but well aired*, and free from drafts, and flannel nightgowns and sheets are used. (4) As tonsillitis is thought to be a common primary cause of the disease, the throat must be kept clean. (5) There being an excess of acid in the system, an alkaline diet consisting chiefly of milk with alkaline waters is used.

Septic Fevers

What is septicemia? By what is it caused?

Poisoning of the system as the result of the entrance of bacteria into the blood and their multiplication there and production of toxins. The condition may be produced by a number of different bacteria.

What are the symptoms of septicemia following operation?

It usually begins with a chill, followed by a rise of temperature, nausea, anorexia, and all other febrile symptoms. The temperature is characterized by marked evening exacerbations and morning remis-

sions; the wound becomes painful and the surrounding tissues congested, and pus, which often has a foul, fetid odor, soon forms.

What is pyemia?

A septicemia, produced by pyogenic bacteria, in which germs, at intervals, settle in some organ or part and give rise to abscesses.

What is the cause of toxemia?

Poisoning of the blood by toxins produced by germs, but the germs are not in the blood, as in septicemia.

Syphilis

How does the syphilis germ enter the body? How is it carried through the system? What tissues does it attack?

It enters the body by inoculation, usually in sexual intercourse, but frequently in other ways, as by kissing, by the use of infected drinking cups, towels, and the like; when dressing the ulcers and other lesions that appear during the second stage of the disease, unless the hands are carefully disinfected on finishing. Also the infection may be congenital. It is carried through the system by the blood and may invade any or every organ.

What are the symptoms of inherited syphilis?

The symptoms, which may appear immediately, or may not come on until the second month, are: a rash, usually erythematous in character, but sometimes papular or pustular; ulcers on the mucous membrane; purulent discharge from the nose, mouth, eyes, or ears, and, in female children, from the vagina. The child has the snuffles, is thin, marasmic, and looks old, and the skull usually shows prominent frontal eminences. Gummata may form in the viscera, and

iritis, keratitis, or deafness develop, and periosteal nodes on the shin bones; or the child may be idiotic, epileptic, or hydrocephalic. When the permanent teeth appear they are small, conical, and notched at the edges (Hutchinson teeth).

What are the symptoms of acquired syphilis?

The symptoms appear in three distinct stages and vary in character. In the first stage, which lasts about six weeks, there is enlargement of the glands, particularly those of the inguinal region, and the chancre or initial lesion appears at the point of infection. The second stage, with proper treatment, may be aborted, but it may last for two or three years. It is marked by eruptions of various types; mucous patches—*i. e.*, irregular areas that are moist, swollen, and covered with a grayish film—appear on the mucous membranes of the nose, mouth, anus, or vulva; and various constitutional symptoms, such as slight fever, malaise, headache, disturbances of the digestive system, inflammation of the eye, otitis, pain in the bones, particularly at night, and falling of the hair. The third stage may begin as the symptoms of the second stage abate, years later, or it may, with proper care, be avoided. The symptoms vary greatly; there may be various forms of skin lesions, indolent ulcers being the most common; gummata may appear in any part of the body; periosteal nodes may form on the bones, especially the shins; the bones of the nose may necrose, causing a sinking in of the bridge of the nose; any of the organs may become diseased; but the brain, liver, and blood-vessels are most frequently affected.

Mention some important points to remember in the giving of mercurial inunctions.

The nurse must wear a rubber glove, to avoid: (1) becoming salivated by the mercury; (2) infection. The part to receive the application is first washed with hot water. The application is made in those parts of the body where the skin is thinnest, such as the inner surface of the elbow joint, the groin, the inner surface of the thighs. As mercury is irritating to the tissues, the inunctions are made to these areas in turn, using one each day, and, to avoid a second application being made to a part too soon, the area used is recorded on the patient's chart.

Tetanus

Mention two essentials in the care of patients suffering with tetanus and give reason.

A dim light and extreme quiet. Though the germs (the bacilli tetani) which cause the disease remain in the wound, the toxins they produce circulate in the blood and poison the brain cells; with the result that such extreme nervous irritability develops that the slightest stimuli—e. g., a noise, a light, movement of the bedclothes—may cause a convulsion.

What is the specific symptom of infection?

A growing rigidity of the muscles of the neck and jaw, which spreads slowly to the trunk and legs.

What kind of wounds are most likely to be infected? Why?

Deep wounds into which soil, or something that has been in the soil, near stables has entered. The bacillus tetani is a normal inhabitant of the intestines of cattle and manure. It grows best without much oxygen, hence in deep wounds.

Tuberculosis

How may the tubercle bacilli enter the body?

By inhalation, through the skin, or the digestive tract. The tubercle bacilli may penetrate the intestinal walls without causing lesions and be carried by the blood to the lungs or other part of the body.

What quality of the tubercle bacilli and common characteristic of the onset of tuberculosis help to make this disease so prevalent?

The tubercle bacilli are less injured by drying than the majority of germs. The onset of the disease is often so slow and mild that a person may have it for months without being conscious of the fact.

What precautions must a person suffering with tuberculosis take to avoid infecting others and to promote his own cure.

Hold a handkerchief before his face when he coughs, expectorate into sputum cups that can be burned or easily disinfected. Burn his handkerchiefs. Disinfect and wash his hands, if they become soiled with sputum. Avoid putting his fingers, stamps, etc., to his mouth. Refrain from kissing. Have the dishes he uses boiled. Follow the doctor's directions regarding his diet. Live out of doors as much as possible, day and night, and have the rooms he inhabits clean and kept as light and well aired as possible—sputum on the floor, etc., of a badly lighted room can retain its virulence for weeks, but the bacilli are killed quickly in open air and sunlight.

What are the most frequent sites of tuberculosis in children? In adults?

The bones, joints, lymph-nodes, peritoneum, and

meninges are most frequently affected in childhood; the lungs, in adults.

Mention some important points to remember in giving the "fresh air treatment" in cold weather.

(1) That there must be no drafts. (2) That if the patient is to feel warm and comfortable, his feet must be kept warm. (3) That there must be sufficient covers to keep the patient warm, but that they must be so arranged that he will not be incommoded with their weight, and that the wind cannot enter between them and the mattress. (4) That the patient must be wrapped up before being taken into the cold air and should be brought under shelter if necessary to loosen the bed covering for any purpose.

Typhoid

State some causes of the prevalence of typhoid.

The bacillus typhosus is not easily killed by drying and can live outside the body for several days. After a person has recovered from typhoid, the bacilli may live for years and multiply in the gall-bladder and urinary bladder and be given off in the urine and feces. Germs in typhoid stools emptied into a vault can be carried through soil for a considerable distance and infect water supplies. Flies that alight upon infected matter may become covered with germs which, later, they deposit upon food.

Mention some important particulars for nurses to remember regarding the disinfection of their hands when caring for a typhoid patient.

(1) That they must disinfect their hands carefully every time they handle the patient. (2) That they must disinfect their hands before touching anything—

the screen, soap, pitcher, etc.,—and wash them *after* disinfection. (3) To be particularly heedful to keep their hands smooth and finger nails short, as, with rough skin and long nails, it is impossible to disinfect the hands thoroughly.

How should infected urine and feces be treated?

They must be sterilized for five minutes or else disinfected in some such way as the following: By adding an amount of 4 per cent. formalin equal to the quantity of urine or feces and letting this stand, covered, for ten minutes, or using 2 per cent. formalin or 4 per cent. carbolic and allowing to stand thirty minutes. Also, various lime disinfectants are used, especially for excreta emptied into vaults. Of these unslaked lime is one of the cheapest and most efficient, the heat generated during the slaking killing all bacteria.

What are the symptoms of typhoid?

The prodromal symptoms are: headache; pains in the back, abdomen, and legs; nose-bleed; anorexia; coated tongue; and usually diarrhea. The later symptoms are: a characteristic eruption; liquid yellow stools; there may be either diarrhea or constipation; there is a characteristic temperature; an enlarged spleen; and the blood gives a Widal reaction.

Describe the usual course of the temperature in typhoid fever?

It rises gradually, reaching its maximum (104°-105°F.) at the end of the first week; it remains at this elevation for from one to two weeks, and then gradually declines. Throughout its course there are daily remissions in the fever, the morning temperature being from one to two degrees lower than the evening.

What is the usual character of the pulse in typhoid?

Slow, considering the fever, soft, and often dicrotic.

What three serious complications are indicated by an increase in the rate and decrease in the strength of the pulse?

Perforation, hemorrhage, or heart failure.

Describe the eruption of typhoid?

It consists of small, slightly elevated, rose-colored spots that disappear on pressure. They appear first about the seventh or ninth day, in greater abundance, and sometimes only, on the abdomen; they appear in successive crops over several days.

What are sudamina, and of what are they the result?

Small vesicles, due to the retention of sweat.

Mention some nervous symptoms that show a serious condition.

Continued delirium, stupor, twitching of the tendons—subsultus tendinum—picking at the bed-clothes—carphologia.

Mention the more common complications of typhoid and their indications.

Hemorrhage, indicated by sudden fall of temperature, rise of pulse, followed by tarry stools or stools containing dark-red blood. Perforation, indicated by a sudden localized pain and tenderness, increase in the rate of the pulse, fall of temperature, and, later, the signs of peritonitis. Pneumonia, rise of temperature, increase in the rate of respiration, dyspnea, and later all other symptoms of pneumonia.

Mention the more important points to remember in the nursing of typhoid. Give reasons.

That the patient must be kept quiet, and lifted and moved very carefully in order to avoid hemorrhage or perforation; that the mouth must be cleansed before and after feeding, before, to guard against the en-

trance of germs into the stomach, after, to prevent the collecting of sordes; to keep the skin in good condition by frequent bathing and rubbing with alcohol, because there is no other acute disease in which bed-sores are so apt to occur; to give an abundance of water, to prevent a toxic condition; to measure the urine in order to detect at once any decrease in the amount passed, it being very important to keep all the excretory organs active—this, also, is in order to lessen the toxic condition; not to let the patient lie continuously on his back, especially if he is old or in a debilitated condition, to avoid hypostatic pneumonia; to be conscientious in disinfecting.

Mention some of the bad effects that may result from neglect of a typhoid patient's mouth.

Ulceration of the tongue or mouth; otitis; tympanites; reinfection of the patient.

What is meant by the term constitutional diseases?

Diseases which affect the entire system.

Diabetes Mellitus

What is diabetes mellitus?

A disturbance of metabolism characterized by impairment of the body's power to oxidize glucose and the consequent accumulation of glucose in the system and its excretion in the urine. Disease of the pancreas which interferes with the secreting of its internal secretion is a common cause.

What important changes are made in the diet?

The quantity of carbohydrate food is reduced to considerably less than the patient's "carbohydrate tolerance"—*i. e.*, the amount that he can take without glucose appearing in the urine. In severe cases, it is

often necessary to restrict protein foods also. Green vegetables are given in abundance and usually the more easily digested fats, as bacon, butter, and olive oil, are given in as large quantities as possible without causing digestive disturbances.

What is meant by acidosis?

Poisoning by the acids that form and accumulate in the system as the result of defective metabolism.

Rickets

To what is rickets due, and how is it characterized?

It is supposed to be due to a lack of fat, proteid food, and salts in the diet. It is characterized by a softening of the bones, delayed dentition, the eruption of badly formed teeth, and other varying features of defective nutrition.

What are the principal requisites in the care of rachitic children?

Fresh air; cleanliness; food rich in mineral matter, as fruit juices, milk, and, if the child is old enough, vegetables, especially legumes, and rare or uncooked beef, eggs, butter. Massage is often ordered to correct deformities of the bones.

Scurvy

What is the usual cause of infantile scurvy?

The prolonged use of condensed or sterilized milk, or of proprietary foods deficient in salts.

What is the usual dietetic treatment for infantile scurvy?

Properly modified fresh milk, beef-juice, and orange-juice about one ounce daily in divided doses.

Marasmus

(a) *What is marasmus?* (b) *Give symptoms.*

(a) An extreme form of malnutrition, in which the child fails to assimilate its food. It occurs, as far as is known, without any constitutional or local disease. (b) The symptoms are loss of weight and strength, anemia, and a subnormal temperature.

What are the important points in the nursing?

To keep the baby warm and clean; to prepare its food carefully and give it *very* slowly; to observe carefully, in order to discover which foods seem to be best assimilated; to note the character of stools and vomitus, and report anything unusual in their appearance.

Hemophilia

What is hemophilia?

A hereditary disease characterized by a tendency to bleed excessively from slight wounds or spontaneously. It is thought to be due to some blood defect.

Purpura Hemorrhagica

What is purpura hemorrhagica? How caused?

A disease characterized by hemorrhage into the subcutaneous tissues, mucous membranes, and, sometimes, the internal organs. The cause is unknown.

Diseases of the Nervous System**Paralysis**

Define the terms monoplegia, hemiplegia, paraplegia.

Monoplegia is a paralysis of a single limb; *hemi-*

plegia, of a lateral half of the body; *paraplegia*, of the body below the waist.

What is acute anterior poliomyelitis?

Inflammation which destroys areas of gray matter of the spinal cord and thus causes paralysis.

What are the important points to remember in nursing paralysis?

To guard against bed-sores; give nourishing, easily digested food; provide a constant supply of fresh air, and warmth. Massage is generally ordered, and is an important part of the treatment.

Neurasthenia

What are the more common causes of neurasthenia?

Worry, overwork, excessive excitement, loss of strength by long illness, the use in excess, of stimulants; inheritance of an abnormal nervous system.

Mention some of the more common symptoms.

Restlessness, insomnia, constant imaginings of pain which are very real to the patient, attacks of vertigo and palpitation, fear of disease, or in some cases, of crowds or open spaces, an increasing inability to fix the attention or to do mental work, a tendency to hysteria, and in some cases specific complications such as anorexia, constipation, indigestion, and migraine.

Mention some qualifications necessary for a nurse to have in order to be successful with neurasthenic patients.

First, she must have a clear understanding of the nature of the disease, and a firm conviction that it is as much a disease as typhoid or pneumonia, and, at least in most cases, no more the patient's fault that

he is so afflicted than if he had either of the other diseases; also, that, for a time at least, it is, in many cases, quite impossible for such patients to exercise self-control. She must have infinite patience and power of self-restraint; be well educated and capable of entertaining; tactful; and be able to give massage and the various packs and baths used in the treatment of such patients.

Hysteria

What are the causes of hysteria?

"The primary cause is a functional neurosis which causes a defect in the controlling power of the psychic centers." The predisposing causes are: heredity, combined with an early training that has failed to teach self-control; overwork; worry.

What are some of the forms that attacks of hysteria take?

Feigned unconsciousness; convulsions; localized hyperesthesia or anesthesia; real or imaginary loss of one or other of the special senses; catalepsy of an extremity.

Mention some points for a nurse to remember in dealing with hysterical patients.

(1) That a nurse has no right to resort to the strenuous measures often used by doctors in such cases. (2) That, though it is necessary to be firm and often better to make the patient feel that those around know that the attack is feigned, a nurse should not show any disposition to unkindness or impatience.

Convulsions

What are the more common causes of convulsions in children?

Excitement, indigestion, worms, the onset of disease.

What would you do for a child in convulsions if there were no doctor near?

Give an enema, emetic, and put it in a hot bath (112°F. to 118°F.)

Chorea

What are the symptoms of chorea?

The primary symptoms are usually restlessness; and awkwardness in movement. The child cannot remain still, but is constantly jerking or moving some part of its body. Later, the restlessness is increased; the movements may be general or confined to one part of the body. The general health usually becomes more or less impaired, the child is anemic, the temper is irritable, and, sometimes, the mental power deficient.

What are the principal points to remember in the nursing?

That the child must be kept quiet and free from all excitement; it should be kept, as much as possible, in the open air, and provided with food rich in salts; those chosen must of course depend on the child's age.

Why is it very important that the primary symptoms should be recognized?

When the significance of the child's restlessness and awkwardness is not understood, it is apt to be scolded or laughed at, which is the worst treatment possible; also, if the child is kept quiet, its studies discontinued, attention paid to its diet, etc., an attack can often be averted.

Diseases of the Respiratory Organs

Adenoids

What are adenoids?

Hypertrophied adenoid tissue.

What are the symptoms, and why is it necessary that they should be recognized?

The child shows a tendency to keep his mouth open, especially when asleep; has frequent colds, and catarrh. Unless the adenoids are removed, the child is usually subject to severe colds and throat complications and otitis media often results; and though after puberty the tissue will atrophy, ill effects, such as chronic catarrh, caries of the nasal bones, etc., are apt to be permanent.

Croup

What would you do for a child with croup if there were no doctor near?

Give steam inhalations, put hot compresses on the throat, induce vomiting, try to keep the child quiet and warm.

Bronchitis

What must be remembered in regard to ventilation in nursing bronchitis?

That fresh air is of even more than usual importance, and draughts of greatest peril.

Asthma

To what is bronchial asthma supposed to be due, and what is the usual emergency treatment?

To a spasm of the muscles of the bronchioles.

TREATMENT: Give plenty of fresh air, hot drinks, hot foot-bath; inhalations of nitrate of amyl or stramonium leaves, are often prescribed.

Pleurisy

What is pleurisy and what are the two varieties?

Inflammation of the pleura, the serous membrane that covers the lungs and lines the thoracic cavity. The two varieties are, pleurisy with effusion and dry pleurisy.

How would you strap the chest in pleurisy?

· Prepare the chest by shaving and powdering. The strapping can be applied in three different ways. (1) Take a piece of adhesive plaster long enough to extend from the far side of the spine to the sternum and wide enough to cover from just below the axilla to below the margin of the ribs, or (2) take several pieces of adhesive plaster about two inches wide and stick them together overlapping each other half their width. To apply the strapping in either case fix one end of the plaster on the spine, make the patient take a deep breath and then "let out his breath," and, while the lungs are thus comparatively empty, quickly stretch the plaster and fix its free end over the far side of the sternum. Mould the plaster to the body with the palm of the hand until all wrinkles are removed. (3) Take several pieces of plaster, two inches wide, cut them the correct size, and apply each strap separately, making the patient "let out his breath" before the application of each strap. Overlap each strip half its width.

· Pneumonia

Mention some points of difference between lobular or broncho-pneumonia and croupous or lobar pneumonia.

In lobular pneumonia, the inflammation is in small scattered groups of alveoli and the condition is pro-

duced by a variety of germs. In genuine acute lobar pneumonia, a whole lobe, or lobes, will be inflamed and the condition is always due to infection by the micrococcus lanceolatus—called also, the *diplococcus pneumoniae* and the *pneumococcus*.

Why is lack of increase in the number of leucocytes an unfavorable sign in pneumonia?

It shows a weak condition of the system.

Which form of pneumonia is most common in infancy?

Broncho-pneumonia.

What can you do to relieve a child in a severe paroxysm of coughing?

Turn it on its face, so that the mucus will run out of its mouth.

What are the predisposing causes of pneumonia?

Cold; inhalation of smoke, gas, coal dust, ether, and other substances likely to irritate the lungs; injury to the chest; accidents that necessitate the use of artificial respiration; too long continuance in one position; a debilitated condition of the system; alcoholism.

What are the symptoms of pneumonia?

Pneumonia usually begins with a chill or, in the case of children, with convulsions, followed by a high temperature, increased respiration, and a cough accompanied by pain. The face is flushed, particularly the cheeks; the nostrils dilate with each inspiration; herpes is generally present, especially around the lips; the sputum, at first, is a frothy serous fluid mixed with mucus; it later becomes extremely tenacious and streaked with blood, and, sometimes, in extreme cases, dark brown in color, it is then called *prune-juice sputum*.

What do you understand by the terms "engorgement," "red hepatization," "gray hepatization," "resolution"?

Engorgement signifies a state of congestion and exuding of blood-plasma into the alveoli. Red hepatization, inflammation, increased exudation and formation of clots in the alveoli. Gray hepatization, a gray color due to the migration of a large number of leucocytes into the clots. Resolution, the liquefaction of the clotted exudate (by a ferment liberated from leucocytes which become disintegrated) and its absorption.

What are the adverse symptoms and conditions to be on the watch for when nursing pneumonia?

An increased amount of blood in the sputum; increased dyspnea, cyanosis, and rate of respiration; unfavorable changes in the pulse; tympanites; edema of the lungs; delirium.

Why is tympanites such a dangerous condition?

It presses the diaphragm up against the heart and lungs and so interferes with their work.

What is the cause of death in a large per cent. of pneumonia patients, and what precaution can a nurse take against it?

Heart failure. Watch the patient carefully to see that he does not sit up in bed or make any other sudden movement, and prevent him exerting himself in the least.

Mention some important particulars to remember when nursing pneumonia.

That the patient must be kept perfectly quiet, in order to save the heart all unnecessary work; that he should not be allowed to talk more than absolutely necessary, as talking is likely to cause coughing; that if it is necessary to restrain him, the restraint must not

be put across the chest or in any way interfere with his breathing; that restraint must only be resorted to if absolutely indispensable, as it is likely to excite him—one of the surest methods of increasing delirium; that the temperature of the room must be kept low, but that all draughts are to be avoided; to apply external heat when the patient's temperature begins to fall; and to be then particularly on the watch for symptoms of heart failure.

(a) *What class of people are most likely to contract hypostatic pneumonia, (b) what are the more common causes, and (c) what prophylactic measure should a nurse take?*

(a) Those suffering from low fevers and chronic wasting diseases; it is more common in the aged. (b) The more common causes are cardiac weakness and a too long continuance in one position. (c) A nurse should not allow such a patient to remain too long in one position.

Diseases of the Heart and Blood-vessels

Diseases of the Heart

What is meant by the expressions "cardiac compensation" and "failure of compensation"?

Compensation means a reserve force and power of hypertrophying possessed by the heart, which enables it for a certain length of time, to do more work than it is usually called upon to perform, and which, when any part of it becomes diseased, often allows of its adjusting itself to the new conditions, thus minimizing the ill effects of the disease. There is said to be a failure of compensation when, for any reason, such as extreme emotion, exertion or illness, the heart

ceases to adjust itself to the conditions forced upon it by disease.

What are the more common forms of heart disease?

Angina pectoris, dilatation, endocarditis, pericarditis, and valvular diseases, such as regurgitation, and stenosis.

What is the cause of angina pectoris?

It usually occurs in connection with other heart lesions, especially after an exciting cause as worry, undue exertion or emotion, indigestion, fatigue, severe climatic changes.

What are the symptoms of, and what should be done for angina pectoris?

A sudden agonizing pain, radiating to the left shoulder and down the left arm, pallor, cold clammy sweat, and dyspnea. The doctor should be sent for immediately as the condition is serious. In the meantime the patient must be kept quiet and reassured, and given plenty of fresh air; inhalations of amyl nitrate or chloroform are generally ordered.

How do you give amyl nitrate by inhalation?

If the drug is in "perles," one is broken in a handkerchief, if not, about 5 minims is poured on a handkerchief, and the handkerchief held to the nostrils.

What is the nature of cardiac dilatation?

The heart muscles lose their normal tone and become relaxed, thus the heart becomes enlarged and its cavities dilated. Unless the condition is rectified, the closure of the valves, especially the tricuspid, is interfered with.

What is the nature, and what are frequent consequences of endocarditis?

Inflammation of the membrane lining the heart. This occurs more especially around the valves and

often leaves a permanent stiffening of their flaps which prevents them closing properly and allows some of the blood to regurgitate. The symptoms that frequently follow are due to this and vary with the valve attacked. If it is the mitral valve, the patient may be troubled with shortness of breath; dyspnea and cough; if the tricuspid, the entrance of the venous blood into the heart is interfered with and the patient becomes cyanosed, is troubled with dyspnea and other conditions resulting from congestion of the internal organs.

What is (1) pericarditis? (2) Myocarditis?

Inflammation of (1) the pericardium; (2) the muscle of the heart.

Mention a common cause of these inflammations.

The germs which cause other diseases, especially tonsillitis, rheumatism and chorea. It is thought that the germs often enter the body through the tonsils when these glands are diseased, especially if they are not properly treated.

What is palpitation?

"A rapid tumultuous action of the heart that is perceptible to the patient."

To what may palpitation be due?

Excitement, indigestion, anemia, nervousness, hysteria, organic heart disease, exophthalmic goitre.

Mention some important points to consider in the care of people who have any form of cardiac disease.

If the patient is confined to bed, everything possible must be done to keep him comfortable and to prevent the formation of bed-sores. Owing to deficiency of oxygen in the blood, such patients are generally troubled with dyspnea and therefore need an abundant supply of fresh air. As their circulation is poor, it is very essential that they be kept warm. At all

times people troubled with heart lesions should be kept as free as possible from all worry, undue excitement, and exertion. Children so afflicted should not be allowed to indulge in any rough play, running, etc.

Diseases of the Arteries and Veins

What is an aneurism?

A localized dilatation of an artery.

Define phlebitis, thrombus, thrombosis, embolus.

Phlebitis is inflammation of a vein. A thrombus is a clot in a blood-vessel. Thrombosis is the coagulation of blood within the blood-vessels or heart during life. An embolus is a thrombus, or part of a thrombus, that has moved from its primary position.

Mention a very essential point to remember in the care of a patient with phlebitis. Give reasons.

That thrombosis is very frequently associated with phlebitis and therefore the affected limb must not be moved unless absolutely necessary and, then, only with the greatest care; as otherwise the thrombus may become dislodged and carried to the heart or brain and so cause instant death.

Diseases of the Blood

What is anemia?

A condition produced by a decrease in the number of red corpuscles in the blood or of the amount of hemoglobin in the corpuscles.

What are the symptoms of anemia?

Pallor of the skin and mucous membrane, dyspnea on exertion, indigestion, loss of appetite and strength. There may also be frequent attacks of syncope; puffiness under the eyelids; and edema of the ankles, especially at night; cessation of menstruation.

How much hemoglobin is there normally in the blood and what per cent. is this said to be.

Fourteen and one half gm. per 100 cubic centimeters. 100 per cent.

What are common causes of anemia?

1. Loss of blood. 2. Hemolysis due to toxins produced by bacteria or defective metabolism, fever, etc. 3. Diseases of the bone marrow. The red corpuscles develop in the marrow from nucleated cells.

How are anemias classified? Give examples.

As primary (e. g., pernicious anemia, chlorosis, leukemia) and secondary (e. g., that following hemorrhage or complicating other diseases).

Why is even secondary anemia serious?

The deficiency of hemoglobin entails deficiency of oxygen and consequently such interference with nutrition that other disease may follow. As the heart-beat is weak the circulation is feeble, therefore, anemic people suffer from the cold, and the air must be warmed. There is a deficiency of iron and other salts in the body, and for this reason foods containing a large per cent. of salts should be given, especially raw beef, beef juice, rare beefsteak, green vegetables, fruit juices, milk, eggs.

Mention some important considerations in the care of anemic persons. Give reasons.

Since the body's supply of oxygen is defective, pure air is very necessary.

Diseases of the Urinary Tract

Mention some constituents of urine the presence of which may indicate disease of some part of the urinary tract.

Albumin, bacteria, blood, pus, renal or tube casts, urinary calculi.

Name some of the more common diseases of the kidneys.

Nephritis; nephroptosis, or floating kidney; nephrolithiasis, or renal calculus; pyelitis.

What is uremia?

“Uremia is a name applied to a group of symptoms resulting from the retention of poisons in the blood; because, owing to disease of the kidneys, they have not been eliminated.”

When nursing patients suffering with nephritis what symptoms would lead you to suspect that an attack of uremia might be imminent?

Headache, vertigo, delirium, sudden blindness, or the patient complaining of dark spots before the eyes, an increasing torpidity. The condition frequently develops suddenly.

What are the later symptoms?

The skin is dry; there is a urinous odor to the breath; the urine is suppressed, or only passed in small quantities; the pulse is slow, and is usually of high tension; as a rule, the temperature is either normal or subnormal, but at times there is a slight fever; there may be coma or convulsions.

If you thought that a patient was likely to have an attack, what medication and appliances would you think you might be asked for, and therefore try to have in readiness?

Croton oil, pilocarpin. Instruments, etc., required for phlebotomy, and for a saline infusion; everything necessary for giving a hot pack or vapor bath.

What is nephritis?

An inflammation of the kidney.

Mention the different types and some differences between the two.

Parenchymatous, interstitial. "In the parenchymatous type, the substance proper of the kidney is inflamed, the kidney is enlarged." The quantity of urine voided is diminished, it is of a dark color, has a heavy sediment, and contains albumin. There is usually edema in a marked degree. "In interstitial nephritis, it is the connective tissue of the kidney that is inflamed, the kidney is, usually, atrophied." The quantity of urine voided is increased, it is of a pale color, and of low specific gravity, and albumin is rarely present in a marked degree. General edema is not as common as edema of the lungs. Nephritis may be either acute or chronic.

What are the usual causes of nephritis?

Acute nephritis may result from exposure to cold or wet; extensive burns, or diseases which are associated with the development of toxins, such as scarlet fever and measles; diphtheria and other acute infectious diseases. It sometimes occurs in pregnancy, and sometimes follows the use, in excess, of arsenic, carbolic acid, cantharides, iodoform, mineral acids, and mercury. Chronic parenchymatous nephritis may follow acute nephritis or it may be chronic from the beginning; predisposing factors are: overuse of alcohol, and chronic infectious diseases, such as tuberculosis and malaria. Chronic interstitial nephritis most commonly occurs as a sequel to chronic rheumatism, heart disease, arteriosclerosis, alcoholism, and gout.

Mention two important points to remember when nursing patients with nephritis.

(1) That there is more than the usual danger of

bed-sores. (2) To wash woman patients carefully after urination; because the urine at such times is often of a particularly irritating nature and, especially when there is much edema present, severe local irritation may result.

What class of foods must be restricted in nephritis?

Proteids, and, if there is edema, sodium chlorid.

Mention some important preventative measures that should always be taken when nursing diseases likely to be followed by nephritis.

To be constantly on the watch for any symptoms of nephritis, and to report any suspicion of their presence; to give a daily warm bath in order to keep the skin active and in good condition; to give all water possible for the patient to drink; to avoid draughts.

What are the symptoms of an acute attack of nephritis?

There may be a slight rise of fever; there is headache; nausea; vomiting; a dull pain in the lumbar region; edema, beginning in the face; the quantity of urine voided is diminished, it becomes darker and contains albumin.

What is nephrolithiasis? To what is it due?

Renal calculi or stones in the kidney; these result from precipitation of various solid constituents of the urine.

When nursing a patient who is supposed to be suffering from nephrolithiasis what should always be done and how will you do it?

Examine all urine voided for stones. Unless the urine is clear, tie a piece of muslin over a chamber and pour the urine on this.

What is pyelitis?

An inflammation of the mucous membrane lining the pelvis of the kidney.

What is cystitis, and what the more common causes?

An inflammation of the mucous membrane lining the urinary bladder. The most frequent causes are: germ infection, irritation due to the over or improper use of the catheter, cold.

How are germs usually introduced into the bladder?

By a failure to take aseptic precautions when passing the catheter.

Mention some faults in catheterization that will cause irritation of the bladder.

Using force when passing the catheter, emptying a distended bladder too suddenly.

Diseases of the Digestive Organs

(a) What is the common name for parasitic stomatitis? (b) What is the exciting cause? (c) In what class of people is it most commonly seen? (d) Of what is it usually the result?

(a) Thrush. (b) It is caused by a species of yeast fungus. (c) It is seen most frequently in poorly nourished babies, but it sometimes occurs in adults when there is a general debility of the system. (d) Improper care of the mouth is the usual cause, and, in the case of infants, dirty feeding-bottles, and nipples are the common causes.

(a) What is gastritis? (b) To what is it most frequently due? (c) What is the important point in the treatment?

(a) An inflammation of the lining membrane of the stomach. (b) Its most common causes are: overeating; overuse of alcohol, tea, and coffee, improper mastication of food; the use of too rich or highly seasoned food; the overuse of irritating drugs;

other diseases. (c) The main point in the treatment is to avoid all food that is not easily digested and also the exciting cause.

(a) *What is appendicitis?* (b) *Its cause?* (c) *Symptoms?* (d) *What are the important points in the care before operation?*

(a) Inflammation of the vermiform appendix. (b) It is due to the action of pathogenic bacteria. Irritation in or around the appendix is a predisposing cause. (c) The usual symptoms are sudden abdominal pain, either general, or localized in the right iliac region, rise of temperature, increase in pulse rate, nausea, vomiting, and constipation; the patient usually lies with the right thigh flexed. (d) Treatment: The patient must be kept very quiet, as, if there is an abscess, any sudden movement might cause perforation of the appendix and consequent peritonitis. Ice-caps are generally ordered, and these must be kept continuously cold.

To what is cholera infantum due?

It is due to germ invasion. Predisposing causes are improper food and feeding, dirty surroundings, and bad air.

What are the more important particulars to be considered in the nursing?

To provide a constant supply of fresh air; to keep the baby warm and clean; to prepare its food carefully and give it in small amounts at regular intervals; to be on the watch for signs of collapse; to put all soiled diapers into a disinfectant as soon as removed.

(a) *What is intestinal colic?* (b) *What are the common causes?* (c) *What is the usual treatment?*

(a) A spasmodic intestinal pain. (b) The usual causes are irritating food, flatulence, fecal accumula-

tion, lesions of the bowel due to intestinal disease, and it frequently occurs as a reflex nervous irritation in other diseases. (c) Hot stupes are often ordered; an enema, the variety depending on the cause of the colic; a cathartic, such as castor oil; and, sometimes, a carminative, such as peppermint, ginger, etc.

What is cholera morbus and to what is it due?

An acute irritation of the intestine, characterized by colic, vomiting, and purging of bilious matter, moderate fever, intense thirst, and general prostration.

To what are the diarrheas of childhood due?

The usual exciting causes are milk or food that has been poisoned by bacteria, over-feeding, indigestible food. Predisposing causes are warm weather and bad hygienic surroundings.

What is the usual treatment?

To keep the child at rest but as much as possible in the open air, to remove irritating matter from the bowel by means of catharsis, and to pay attention to the diet. Diapers should be boiled before being reused.

What is the diet usually ordered in such cases?

It depends on the age of the child; older children are generally given boiled milk, thin bland gruels, or barley water. Infants are generally given whey or barley water, until the active symptoms cease when milk, the percentage depending on the baby's age, is added in gradually increasing amounts.

What is dysentery?

An inflammatory disease of the colon, characterized by abdominal pain, tenesmus, and frequent stools containing blood and mucus.

Mention the three types and their causes?

(1) Catarrhal, (2) amebic, (3) bacillary. The

catarrhal type is thought to be due to germ invasion, though no special germ has yet been found. The amebic variety is caused by the *ameba coli*. The bacillary form is due to the *bacillus of Shiga*. Predisposing causes in all three forms are: warm weather, unhygienic surroundings, irritating food, exposure to cold and wet.

What are the special points in the nursing?

To keep the patient quiet, clean, and cool; disinfect all stools; pay attention to the diet; the foods usually ordered are: whey, barley water, boiled milk, and bland gruels, as arrow-root.

What are the causes and symptoms of acute intestinal obstruction?

The common causes are: strangulated hernia, intussusception, paresis of the intestine, a twist or knot in the intestine, congenital deformity of the intestine, impaction by foreign bodies. The symptoms are: sudden abdominal pain, absolute constipation, abdominal distention, vomiting of stercoraceous matter, and gradually progressing symptoms of collapse.

Name and describe the animal parasites that sometimes infest the intestine.

Cestodes, or tapeworm, a worm about two or three yards in length with a head the size of a pin-head, provided with four cup-like suckers, and attached to the body by a thread-like neck. *Nematodes*, or roundworms, which resemble earthworms. *Oxyuris vermicularis*, also called seat-worm, and pinworm, are worms from one eighth to one half of an inch in length; they are most commonly seen in children. *Uncinaria* or *ankylostoma*, hook-worms, eight to sixteen mm. in length. These last are common in

southern countries, and are supposed to be the cause of much of the anemia and digestive disturbance common in such lands.

When examining a tapeworm, what is it necessary to determine and why?

If the head has been passed, because until the head is passed the worm will grow again.

How do these worms enter the human intestine?

The eggs of the tapeworm are ingested by animals, and the embryos are liberated in the stomach and later migrate to the organs and muscles, where they become transformed into encysted larvæ. When flesh, thus infected, is eaten by man, the scolex fastens itself to the mucous membrane of the intestine, and soon develops into a mature tapeworm. The other worms are thought to enter the body through water and food, especially the former.

What is peritonitis and what are the more common causes?

An inflammation of the peritoneum, either general or localized. Its more common causes are: rupture of a gastric or intestinal abscess, or of a suppurating appendix, gall-bladder, or Fallopian tube; infection of an abdominal wound; perforation of the peritoneum by an external wound; general infections, such as septicemia or tuberculosis.

What symptoms following an abdominal operation would indicate peritonitis?

A rise of temperature; small, rapid pulse; abdominal pain; shallow respiration; constipation; tympanites; hiccough; vomiting; and the face gradually assumes a pinched appearance and anxious expression.

What is jaundice and to what is it usually due?

“Pigmentation of the tissues and secretions with

bile pigments."¹ It is generally due either to obstruction of the bile-duct or to toxemia.

(a) *What is cholecystitis?* (b) *What is cholelithiasis?*

(a) Inflammation of the gall-bladder. (b) Gall-stones in the biliary-duct.

Mention some important points to remember in the care of patients suffering with cholelithiasis.

To encourage the drinking of water between meals, to exclude fat from the diet, to watch the patient carefully during attacks of colic for symptoms of collapse, and if hot-water bags or poultices are ordered, to be careful not to burn the patient as, owing to the agonizing nature of the pain, such patients crave an intense degree of heat.

Abnormalities Attending Menstruation

(a) *What is amenorrhea?* (b) *What are the common pathological causes?* (c) *What is the usual treatment?*

(a) Absence of menstruation. (b) The common pathological causes are: changes of climate or occupation; psychical disturbances; catching cold; getting the feet wet; sea-bathing or getting the feet wet during menstruation; certain diseases. (c) The treatment usually ordered is: removal of the exciting cause; iron tonics; a diet consisting largely of foods containing iron and other salts, and of an easily digested character.

What are menorrhagia and metrorrhagia, and to what are they due?

Menorrhagia is an excessive or prolonged menstruation; metrorrhagia is a bleeding from the uterus at frequent intervals. Both conditions are usually due

¹Stevens's *Practice of Medicine*.

to some diseased condition of the uterus, as the presence of tumors or endometritis; or to some general malignant disease, as tuberculosis or syphilis.

(a) *What is dysmenorrhea?* (b) *What are its common causes and treatment?*

(a) Painful menstruation. (b) Its more common causes are ill development of the uterine blood-vessels, a narrow cervical canal, obstruction of the cervical canal, ante flexion of the uterus, hyperesthesia of the lining membrane of the uterus, and nervous disorders. The general health must be cared for, especially nerve disturbances; a laxative is given just before the beginning of the period; and the patient kept in bed for the first twenty-four hours. Local treatment or operative measures are sometimes necessary.

Diseases of the Uterus and Appendages

What is anteversion of the uterus? What is ante flexion?

Anteversion is a tilting forward of the uterus, a condition generally due to the presence of a mass behind it. Ante flexion is a bending forward of the uterus upon itself.

What is endometritis?

Inflammation of the membrane lining the uterus.

What is prolapse of the uterus? What is retroversion?

Prolapse is a falling down of the uterus, it is usually due to laceration of the perineum or relaxation of the uterine ligaments. Retroversion is a backward displacement of the uterus.

What are salpingitis and pyosalpinx?

Salpingitis is an inflammation of the Fallopian tubes; it may be either infectious or non-infectious; the former is generally due to invasion of the gonococci,

the streptococci, or other pus-producing germs. The latter may result from cold, injuries, the introduction of irritating substances into the uterus. Pyosalpinx is a collection of pus in the tubes, due to infectious salpingitis.

What is oöphoritis, and to what is it generally due?

Inflammation of the ovaries. It is most frequently due to infection by the gonococci, or by the pus-producing organisms. The latter infection often follows puerperal infection.

Mention some points to remember in the care of patients suffering from uterine diseases.

(1) That such patients are usually nervous and therefore, though they need to be entertained, should be kept quiet and free from excitement and worry. (2) That good results from local treatment will be minimized as long as the general health is impaired, and, therefore, a liberal supply of fresh air, nourishing, easily digested food, and attention to all the laws of hygiene are absolutely indispensable. (3) When vaginal douches are ordered for inflammation, they, as a rule, are required very hot, and great care must be taken not to burn the patient. (4) When there is any discharge, it must be washed away before inserting the nozzle in the vagina and the nozzle must be boiled after use. (5) That care must be taken when putting a patient in position for examination by the doctor, and when holding the speculum, etc., as mistakes in such matters are very annoying to the doctor and embarrassing for the patient.

Diseases of the Eye

Mention some important infectious diseases of the eye.

Gonorrheal conjunctivitis, and ophthalmia neonato-

rum, catarrhal conjunctivitis or pink eye, diphtheritic ophthalmia, trachoma.

Mention some important particulars to remember in the treatment of purulent eye diseases.

(1) That they are highly infectious. (2) That the eye must be washed or irrigated sufficiently often to prevent the pus from remaining long in contact with the cornea. (3) That nothing hard must touch the cornea. (4) That compresses must be changed about every two minutes. (5) That the same compress must not cover both eyes, and that if only one eye is infected the healthy one must be shielded. (6) That fresh air, good nourishing food, and cleanliness are all important details of the treatment. (7) That sweeping is to be done with a damp duster over the broom and dusting with a damp duster; any furniture that will be ruined by this treatment should be removed from the room. (8) That the light in the room is to be subdued. (9) That, when convalescing, the patient must not be allowed to read or use his eyes for any purpose that requires fixed attention without the doctor's permission.

What is the name of the operation that is sometimes performed to facilitate the cleansing of the eye when there is much pus and discharge?

Canthotomy.

Diseases of the Ear

(a) What is otitis media? (b) What is it often the result?

(a) Inflammation of the middle ear. (b) Of lack of care of the mouth in illness; of chronic nasal catarrh; and, in the case of children, of adenoids.

Mention some adverse symptoms for which a nurse must be on the watch when nursing a patient after a mastoid operation, and their significance.

(1) Profuse secretion in the wound; this indicates that the entire focus of disease has not been removed, or that bacterial infection is still continuing. (2) Rise of temperature; this shows an increase of infection. (3) Headache, vomiting, and chill; these may all mean that cerebral complications are developing.

CHAPTER XII

SPECIAL SENIOR QUIZZES

Duties of a Head Nurse. Private Nursing. Methods of Teaching Nursing.

Mention some talents that a nurse must cultivate if she wishes to be successful as a head nurse.

To understand people; tact; to be able to reprove without causing anger; dignity; a keen observation; sense of order; a good memory.

Mention some of the important duties of a head nurse.

To see that her patients are treated kindly; that the doctor's orders are carried out and all nourishment, medicine, and treatment given properly and on time; that all necessary supplies are always on hand and that they are not wasted; that the ward, its lavatories, pantries, etc., are always in order, well ventilated, and at a proper temperature; to supervise and teach those under her; to imbue her nurses with an interest in, and love for, their work and a keen sense of loyalty to their school and its officers; to give a conscientious report of her nurses' work and conduct to the superintendent.

(a) Mention one of the most important times for a head nurse to pay special and, if possible, personal attention to a patient. (b) Give an important, other than humane, reason.

(a) When a patient is first admitted to the ward.

(b) A little personal attention from the head nurse

pleases patients and their friends, gives them a good impression, and so is apt to lessen any possible tendency to be over critical or on the lookout for lack of attention, etc.

If a patient made complaints of a nurse which you knew to be untrue would you think it just to the nurse to change her? Give reasons.

Yes. A nurse ought to be able to appreciate that when ill, any slight incompatibility of disposition is apt to cause dislike, and that the patient's feelings must be considered before hers. Unless a patient's wishes are regarded in such a matter, he is apt to find cause for further discontent and complaint.

Mention some things relating to the patient's comfort, the necessity for which a head nurse must impress upon her pupils, and for the carrying out of which she must be constantly on the watch.

That patients are not kept waiting for the bed-pan or drinks; that their pillows are turned frequently; that the beds are brushed out after every meal; that the under sheets are tightened as often as necessary to keep them free from wrinkles; that the upper bed-clothes are not drawn too tightly over the feet; that a helpless patient's position be changed frequently; that the shade is lowered when the sun is shining in a patient's eyes; that patients are never unnecessarily exposed during treatments, etc.

How often should a head nurse inspect the beds to see that the under sheets, the patient's binder or bandage, etc., are in order?

At least twice a day.

What should a head nurse do in order to avoid mistakes in the carrying out of new orders?

Orders should be always written, and the head nurse

should, herself, read them over with the nurses, and be sure that they understand them and know how to carry them out.

How, only, can a head nurse be sure that treatments are properly given?

By constantly going behind the screens when the treatments are being given, and by always watching a nurse when she gives a treatment for the first time—even though she has been taught in clinic or is a senior nurse; by never taking it for granted that even seniors can give the simplest treatment, unless she has seen them do it.

What points would you notice while watching a nurse give a vaginal douche?

If the solution were the right temperature; if the patient were in the right position and as comfortable as possible; that, if there were any discharge present, the nurse washed the parts before inserting the douche nozzle; that she expelled the air from the tubing before inserting the nozzle; that she constantly moved the nozzle in the vagina during the giving of the douche.

What points would you notice while watching a nurse prepare for a surgical dressing?

That she sterilized the instruments, etc., and disinfected her hands for the required length of time; that she touched nothing unsterile, nor allowed any unsterile object to come in contact with one that was sterile; that she did not permit anything sterile to remain uncovered one minute longer than absolutely necessary; that she washed the rims of bottles with a disinfectant before pouring out the solutions; that she did not take more solution than necessary; that she tested syringes to see that they were in order.

State some of the more common sources of waste in hospital wards, and give examples.

Food, giving patients more than they can, or should, eat; solutions, pouring out three or four ounces of salt solution for the dressing of a closed wound, when about two drams is all that is required; gauze, making too large dressings or sponges, throwing away, or using for dusters, gauze that could be reesterilized; unnecessary wear of bed-linen, towels, etc., by changing them oftener than necessary.

What can be done to make nurses more careful of their dusters, and to prevent their using gauze for dusters?

Provide each nurse with a hemmed, unbleached muslin duster at stated intervals; require her to mark it with her name, to keep it clean and make it last the given length of time. (If the hemming is done by convalescent patients it will not entail loss of time.)

State two things that a head nurse can do to make her pupils careful in their use of bed-linen.

She can make a practice of inspecting the sheets that they remove from the beds, and she can require nurses who show a tendency to be liberal in their use of linen to keep count of the number of sheets, towels, etc., which they use.

Mention some other points that nurses must be cautioned about regarding the care of bed-linen, towels, etc.

That badly soiled or wet linen is not to be put into the clothes hamper; that all stains should be removed while the staining agent is wet, as washing in cold or lukewarm water is then, as a rule, all that is necessary; that torn sheets, etc., should not be used until mended; that pins must be removed before sending clothes to the laundry; that clothes are only to be pinned when absolutely necessary.

Ought the under nurses to make out the orders for supplies, etc.?

Only under the direct supervision of the head nurse. The senior nurse, especially, should be required to make out requisitions for supplies, diets, etc., sufficiently often to learn how, but otherwise the ordering of all supplies, etc., is the head nurse's duty.

Mention some points in connection with the serving of ward patients' meals to which the head nurse must pay special attention.

That nurses do not begin treatments, etc., that they will not be able to finish before meal time; that they start to serve the meals as soon as the food arrives; that the trays are set before the meal hour, the steam-table and dishes heated, and except on the hottest of summer days, the windows closed. During the serving of the meal, it is necessary to see that the cold food is put on the trays before the hot; that the trays are carried to the patients as soon as ready, and not allowed to wait until all have been prepared; that those intended for helpless patients, whom the nurse has to feed, are prepared last; that there are no mistakes made in the special diets.

What must a head nurse do if she wishes to have the work of her ward done accurately and on time?

(1) She must, as far as possible, plan the days or hours when it is to be done; (2) have the nurses report when they have finished certain kinds of work, as that which is usually required to be done before "morning rounds," the special cleaning for the day, the cleansing baths, making the patients comfortable for the night; (3) inspect the work which the nurses have pronounced finished.

Mention two things that a head nurse must consider when planning the work.

(1) Not to demand that more be done in a given time than the majority of people could accomplish; (2) to so arrange the hours for the ward work and that in the lavatories and outside rooms, that there will be no excuse for all the nurses being out of the ward at one time.

Mention some of the things you would notice when inspecting the lavatories.

That they presented an orderly appearance; that there was no dust in corners or high places; that there was no odor; that the closets were clean, the bed-pans and all other utensils clean, odorless, and dry; that the tubing of the douche cans recently used were hanging so that they would drain and dry, and thus be prevented from rotting inside, with the consequent risk of specks of disintegrated rubber being washed down in the next douche or irrigation; that there was nothing out of repair.

When should inspection be made?

Whenever possible; inspection should be made as soon as a nurse reports her work finished.

What must nurses who forget easily be taught to realize concerning the cultivation of memory?

That to cultivate the memory one requires (1) to learn to concentrate the attention, (2) to acquire the habit of (a) frequently recalling things to be remembered to mind, and (b) of forming several mental associations with the things to be remembered that will help in recalling them; for the probability of remembering a thing depends upon (1) the strength of the original impression on the mind and (2) the number of associations which will recall it to mind.

State some things that a nurse must remember if she wishes to train those under her properly.

That it is necessary to study their characters; to observe if praise makes them conceited, or if praise for things well done will not have a more beneficial effect than constant blame; that after correcting a nurse it is necessary to watch for improvement and, if it takes place, let her know that it has been noticed; never to reprove for a first offense, but rather to explain to the offender wherein her offense lies, and why it is such; never confound "necessary severity" with loss of temper; never reprove while angry.

How should a head nurse feel in regard to her obligation to teach her pupils?

That it is as much her duty to teach them, as it is their duty to care for the patients.

Has a head nurse any right to teach her nurses different methods than those taught in clinic?

This should be done only with permission from the head of the school. In order to prevent deterioration of methods, it is essential that there be more or less uniformity of system in a hospital and for all concerned with the teaching to be notified when new methods are introduced. But, to prevent stagnation, it is well for everyone to be on the watch for new, improved methods.

Does teaching the probationers in clinic lessen the head nurse's obligation to teach them?

No, it should only change her manner of procedure; instead of showing them how to do things, she should watch them work and ask them questions to ascertain if they remember what they have been taught.

(a) If you were not sure that a nurse knew how to

give a treatment, what would you say? (b) What would you never say? (c) Why?

(a) How do you give this treatment? (b) Do you know how to do this? (c) Very serious mistakes have occurred because nurses thought they knew, when they had forgotten some very essential detail.

How can you help your nurses to remember their materia medica?

By frequently, after they "have given out the medicines," asking them questions regarding those which they have given.

How can the nurses best be taught something of the diseases from which the patients they are caring for are suffering?

By making a point of securing time to ask them a few leading questions regarding the diseases with which the patients admitted during the day are afflicted and, if they cannot answer, telling them what book, or books to read, and questioning them again next day.

Why is this a particularly important mode of instruction for the younger nurses?

It makes them form a habit of looking up interesting or important detail, and, if the questions are well chosen, it is particularly helpful in assisting them to choose what to study and in realizing the most important points for a nurse to remember regarding those diseases.

Give examples of questions you would ask a young nurse about typhoid fever.

What were the active and predisposing causes of the disease, the location of the characteristic lesions, the more common ways of transmitting the infection, and the care and disinfection necessary to prevent

the infecting of others; the symptoms of the disease, the reason for the toxic condition often present, the more common complications and sequelæ and their symptoms. The means that must be taken to avoid those complications, the principal points to be considered in the nursing, the disastrous consequences that may result from lack of care of the mouth, the points to be considered in giving cold baths.

Give examples of questions you would ask regarding the giving of a cold bath to a typhoid patient.

The probable consequence of improper lifting or moving of the patient; why such conditions were likely to occur. The good effects that were to be expected from the bath; the physiological causes of such results; the means taken to secure these results and the bad effects likely to occur if these means are neglected. The symptoms which would indicate that the bath was having a bad effect.

Mention some questions that you would ask a nurse who you had been told was to go on night duty for the first time.

The symptoms of hemorrhage and what she will do in case of such an emergency; the symptoms of overdosing with opium, digitalis, strychnine, and other medicines given for a long time or in large doses; how often she will take the pulse of very sick patients during the night; what she will do for those who have little vitality and those who cannot sleep; and questions regarding routine night work or treatment likely to occur during the night, that I have not seen her give.

Private Nursing

Mention some complaints frequently made against nurses doing private nursing.

Their unwillingness to take certain cases, even in emergencies; not being ready to respond to calls after they have notified the registry or doctors that they are; extravagance in their use of bed-linen and supplies; unwillingness to do anything that they do not consider "a nurse's duty."

Give some instances that should govern a nurse's restrictions as to the kind of cases she will and will not take.

A nurse who has a family to support, or who has a particular tendency to contract infectious diseases, has a right to refuse to take such; otherwise, though she has a right to say when she registers that she prefers not to take them, it is against the spirit of the profession to refuse to do so in emergency. All nurses are not so constituted that they can be successful in the care of nervous patients; those who know by experience that they are not, have every right to say so, but it increases the respect of the medical profession, not only for the individual nurse but for nurses in general, when, at their request, a nurse is ready to take the "case" at least for a time, until some one who is more suited to the work can be obtained. Every nurse has a right to say that she does not care to take obstetrical cases, no nurse has a right to refuse an emergency call.

Mention some ways of avoiding extravagance in the use of bed-linen.

(1) Be careful when making the bed, giving treatments, etc., not to crush the sheets; (2) as the sheets will get more crushed at night than in the daytime, change them in the evening, air those removed and then fold them carefully, (3) use a table napkin or towel to protect the covers at meal-time; (4) use paper

or other pads to protect the sheets whenever defecation or micturition is involuntary.

From what is friction with the servants most likely to arise?

The nurse's demanding too much assistance from them.

Mention some cases in which a nurse should do the cleaning of her patient's room.

(1) When the patient is suffering from a contagious disease; (2) if the servant is awkward, or frightened to enter or work in the room; (3) if, as is often the case with nervous patients, it is better that no one but the nurse and doctor should enter the room; (4) if the family are short of help.

What must be done if the sick-room is to present an orderly appearance?

If there is no cupboard or other place where the medicines, appliances for treatment, etc., can be kept in order and out of sight, they should be kept together on a tray, and the tray neatly covered.

What piece of furniture do nurses very often spoil and how can this be avoided?

The table by the patient's bedside. By covering it and putting a smooth pad under the cover; if the table is a costly one the danger of its being spoiled by medicines, hot trays, etc., should be explained, and a less valuable one asked for.

When possible to choose the patient's room, what points would you consider?

That it is in a quiet part of the house; that it can be easily ventilated; if winter, that it will get the sun a good part of the day; if summer, that it will not get too much sun; that, if possible, it is on the same floor as a bathroom.

Mention a few methods of keeping the air continuously fresh in the sick-room in cold weather.

(1) By an open fire or a lighted lamp in a fire-place;
(2) raising the lower sash or lowering the upper, and fitting a finely perforated board into the aperture.

What must be the first consideration in choosing a room for operation?

It must have a good light, *i.e.*, the room must be bright and there must be one window in which the sun will not shine at the time of operation.

If necessary to render the window opaque, how can you do so?

By rubbing it with a bar of soap or bon ami moistened in water.

Mention some conditions which would make it unwise to remove the carpet before operation.

If the floor is in very poor condition and not likely to be easily cleaned; if preparations are not started more than twelve hours before the operation.

If necessary for the carpet to remain on the floor, how will you protect it?

With several layers of paper covered with sheets. The sheets must be fixed so that there will be no danger of their being disturbed.

What is the ideal way of preparing a room for operation?

Twenty-four hours before the time appointed for operation remove all pictures, rugs, carpets, curtains, superfluous furniture, etc. Have the ceiling and walls thoroughly brushed, the floor and woodwork scrubbed, and the room well aired. Cover the tables that are to be used for holding the instruments, solutions, etc., with paper and pin a towel securely over these. Arrange the pad and drainage for the

operating table, and, as far as possible, get all the "unsterile work" finished, and then close the room and allow no one to enter it until time to prepare for the operation.

Mention one thing that is very important to remember in cold weather.

That the temperature of the room is to be between 76° and 80° F.

How should the pitchers, basins, etc., be rendered sterile?

Preferably by boiling for fifteen minutes; when this is impossible, by standing in a disinfectant for from one hour to two hours according to the strength of the disinfectant.

What can be used to put the patient in the Trendelenburg position?

A kitchen chair, padded with a pillow or blankets covered with rubber. The back of the chair to be placed under the patient.

State two things that can be used for a stretcher.

(1) A padded ironing board; (2) two straight-legged chairs with the legs tied together, padded with pillows securely tied in place.

How can you improvise a Kelly pad?

Roll a small blanket tightly over a strip of strong bandage; the roll should be about one yard in length and nine inches in circumference; the bandage should extend half a yard beyond the roll at either end. Roll the blanket in one end of a rubber sheet. This rubber sheet should be the width of the roll and sufficiently long for its free end to reach into a pail standing on the floor. Tie the ends of the bandage together so as to draw the roll into a semicircle.

What should be the shape of the operating-table?

Long, narrow, and high.

If a table the right shape cannot be obtained, how can one be improvised, and what precaution must be taken?

Two or three small tables can be used, or two small tables and an ironing-board or leaf of an extension table. If the tables are not sufficiently high they can be raised on magazines. The legs of the tables and all other additions must be securely tied together.

In choosing the furniture, what two very important points will you keep in view?

That it can be easily cleansed, and that it is not valuable.

Describe one way of arranging a sheet as a substitute for a doctor's gown.

Place a sterile sheet across the front of the body directly under the armpits; be careful, while unfolding and placing it in position, not to let it touch anything unsterile, and only handle it with sterile hands and at its extreme edges. Bring the two upper corners over the shoulders and upper parts of the arms; pin the upper edge of these ends to the front of the sheet; carry the points under the arms and pin them so that they will form a short sleeve; pin the back edges of the sheet together at the back about the waist line.

What is it well to do when making an obstetrical engagement in order to avoid misunderstandings?

To make out a written agreement and sign it, and have the patient or her representative sign it.

What should be a nurse's feeling regarding her right to ask for release from such an agreement?

That she has no right to expect to be released, and

that she should ask for release only in a case of vital necessity.

Give a list of the baby's clothes, etc., you would advise a prospective patient of moderate means to get, if she asked your advice.

One dozen white slips; six flannel slips with sleeves, for night; ditto, for day; six woollen woven shirts with long sleeves; six soft knit abdominal bands; two soft light shawls, four dozen diapers. Six soft wash cloths; one dozen soft towels; two flannel bathing-aprons; one dozen medium-size safety-pins; baby's hair-brush; bath; hot-water bottle for crib.

What drugs would you think it necessary to have on hand for a confinement case?

Ergot, brandy, sterile boric-acid solution; nitrate of silver, or the substitute used by the doctor attending the case; sterile salt solution, bichloride tablets, a small quantity of lysol.

What sterile dressings should be provided?

One dozen large vulva pads; three and one half dozen small vulva pads; gauze or cotton sponges for mother's dressing, six dozen packages, with six sponges in the packages to be used the first two days, and four in the others; sterile tape to tie the cord; twelve sterile gauze compresses to dress the navel; wipes for the baby's eyes; one small package absorbent cotton for cleaning the baby's mouth.

Name some other sterile supplies that will be needed.

Four sheets; twelve towels; accouchment pad; one pair maternity stockings; receiving wrap for baby; two doctor's gowns; rubber and glass catheters; douche points; douche can or bag; scissors; dairy thermometer; white vaseline or olive oil; green soap; nail-brushes; medicine dropper; two sterile pitchers;

sterile jar for thermometer; sterile jar for boric-acid eye-wash; one small and one large hand basin; hot and cold sterile water.

What are some of the unsterile supplies that will be needed?

Rubber sheeting, one piece for bed and one for operating-table—if such is used; abdominal binders; vessel to receive placenta; two slop jars.

What will you have in readiness in case the baby should be asphyxiated?

The baby's bath and hot—120° F.—and cold sterile water.

How should the room be prepared for confinement?

It should be thoroughly aired and cleaned; clean, washable curtains are to be preferred to other draperies, and rugs to carpets. Rugs and expensive furniture should not be near the bed or operating-table during labor.

Teaching

Mention some things which a teacher must know.

Her subject or subjects, the principles of psychology and teaching, the capabilities of her pupils.

Why is it especially important that one teaching nurses should be interested in her work?

Without interest it is impossible to put sufficient enthusiasm and force into a lesson to rivet the attention of the pupils and thus bring their retentive faculty into play, and as nurses, more often than not, come to class tired, and thus unprepared to concentrate their attention, they are very dependent on the magnetic influence of the teacher.

Mention some essentials in the mode of questioning, necessary to hold the pupil's attention.

To avoid questioning them in the order in which they are sitting in class; to ask the question before mentioning the name of the pupil who is to answer; to be prompt in questioning.

What should, and what should not, be the character of the questions?

Their meaning should be clear, they should be as concise as possible, and should be chosen with regard to their fitness to make difficult parts of the lesson plain and to emphasize important portions of it. They should not be such as will require only yes or no for an answer; they should not suggest the answer, nor be of an elliptic nature.

Lectures and Reviews

What are the two principal objects of lectures?

To give information not generally included in text-books, and to bring out and emphasize the most important portions of important subjects.

In order to accomplish this last object, what plan should be followed in preparing a lecture?

First, it must be decided what is the most important matter relative to the subject; next, this must be put into as concise and clear a form as possible, carrying out the most natural sequence in the placing of the different portions of the lecture, and, as far as possible, finishing each portion before going on to the next. The beginning, especially, should be striking and interesting. Any legend, tale, or personal experience bearing directly on the subject and of a nature to impress it on the listeners' minds can be included, but any irrelevant matter, or anything likely to distract the attention from the immediate subject

of discussion, ought to be avoided. It must not be too long—*i.e.*, longer than can be given in from three-quarters of an hour to an hour.

Mention some important points to remember in giving a lecture.

To speak slowly and distinctly; to watch the pupils' faces in order to be sure that they understand and are interested; to state the aim, purpose or nature of the lecture at the beginning so that the pupils will have some idea of what is coming and be better prepared to follow; to discuss the parts of the subject matter in their most natural sequence and, as far as possible, finish the discussion of one part before going on to another; to emphasize, or otherwise draw the pupils' attention to, points of special importance, but to avoid laying stress upon minor details; to mention reference books, to which the pupils have access, in which they will find matter connected with the subject of the lecture; to encourage questions and discussion at the conclusion of the lecture.

What important precept regarding the object of education is it well to bear in mind in order to develop a good method of teaching?

"Education has for its immediate object the development of the power of thought, not the impartation of knowledge."

Mention two important purposes of reviews.

To make the pupils recall former lessons; to see if pupils have understood and remembered past work.

(1) What error is a teacher likely to make in teaching demonstrations? (2) What will make her avoid this error?

To exaggerate the importance of some particular way of doing things and so spend time and effort on

detail that ought to be given to mastering essentials.

(2) Realizing that the same results may be obtained in different, but equally good, ways and, owing to individual differences, certain ways may be easier to one person than another.

Demonstrations

Mention some benefits to be derived from teaching practical nursing by demonstration.

(1) A more uniform method of work can be thus maintained in the hospital; (2) the nurses are more carefully taught, as, in the ward, the head nurse can not, or does not, always take the time to exact sufficient neatness and attention to detail; (3) they can be thus better instructed in the why and wherefore of the detail of their work.

Mention a few details that you would pay particular attention to in a demonstration.

How the patient was moved; that he was exposed as little as possible; that there was no jarring of the bed; that the work was done quickly, but quietly and without any appearance of haste; that, when finished, the work looked neat, and that the place was kept tidy while the work was in progress.

Describe a method of giving demonstrations to probationers.

The day previous to the demonstration, require the pupils to read the method described in their textbook; if this method differs from that in use in their hospital, explain wherein it differs, and why the one they are to use is to be preferred. Require them to study this lesson thoroughly and the next day have one or more demonstrate it. The instructor must

watch the work carefully and not allow any mistakes to be made, for if the pupils see the thing done wrongly they may later confuse the right and wrong way. The pupils not demonstrating should be required to be on the alert and ready to express their opinion. If the work is not entirely satisfactory, the teacher should demonstrate and call the pupils' attention to points in which they failed. The pupils should then try again.

What advantages are to be derived from this method of demonstrating?

(1) It teaches the pupils to think for themselves; (2) it impresses the detail of the demonstration in their minds; (3) it teaches them why errors which they are likely to make are errors.

Give one reason why it is very important to impress upon pupils that, though they are required to follow certain ways of doing things in their hospital, there are many right ways, and that methods that are most satisfactory in one hospital might be absolutely inadequate in another.

A great deal of adverse criticism is continually being caused by unwillingness on the part of nurses to carry out the methods of the doctors for whom they are working, or hospitals to which they go, because the methods are not those taught them in *their hospital*.

Mention demonstrations that are of particular importance in order to guard against embarrassing accidents.

The position and draping of patients for douches, enemas, catheterization, and gynecological examinations.

If you could not afford to buy a jointed manikin for demonstrations of this kind, how would you make one?

Make a large doll of strong unbleached muslin—about 5 feet 3 inches in length and 80 pounds in weight; stuff it with rags and sawdust, or like material, leaving empty spaces about an inch wide (stitching the two sides of muslin together above and below the spaces), for the elbow, groin, and knees; sew tape strings on the legs, thighs, and chest for the purpose of holding the legs in the position in which they are placed. Stockings can be used for making the legs and feet, and gloves for the hands.

When teaching probationers to dust, what points would you emphasize?

The danger of dust; the fact that the nurses are required to do the dusting instead of the ward-maids, because it is expected that they, knowing the danger of allowing dust to accumulate in a hospital ward, will be more faithful in the performance of their work; that one reason for providing glass and iron furniture for hospitals is that it may be washed and dusted with a damp duster; that, when dusting, a basin of water is always to be at hand to wash the duster in, from time to time; that the duster must be damp, but not too wet; that polished furniture cannot be so treated; that dusting should be done with a single, firm movement, and not by passing the hand back and forth over the same ground, thus wasting time and energy; that all corners must receive particular attention; that, after dusting, everything should be replaced in its exact place.

What points will you particularly caution the pupils to remember when teaching them to prepare a room for the admission of a patient?

To be sure that the room and everything in it are absolutely clean and in order—fresh paper in the

bureau drawers and on cupboard shelves; that the room is well aired; a proper temperature—about 68° F., unless otherwise ordered; that there is water in the pitcher; that there are towels, and soap on the washstand; that the bed is turned down and, if the weather is cold, a hot-water bag in it.

What instruction will you give probationers when showing them how to fill a hot-water bag?

To expel the air before filling the bag; not to use water exceeding 150° F.; not to fill the bag more than half its capacity; to expel the air before putting in the stopper; to hold the bag upside down and shake it, in order to be sure that it does not leak; to tie it *carefully* in a flannel bag before putting it in the patient's bed; the danger of burning patients, the physical conditions that increase this danger, and the methods of guarding against it; the obligation of the nurse who puts the hot-water bag in the bed to inform the nurse relieving her that she has done so; that when a hot-water bag is given for relief of pain, the patient must not be the one to judge if it is too hot.

What instruction would you give in connection with the demonstration of an ether-bed?

The reason for heating the bed, for keeping the patient's head low; for having shock-blocks, kidney-basin, mouth-wipes, towel and mouth-gag at hand; the necessity to be sure that any stimulation likely to be required, and that everything needed for giving it, either by rectum or subcutaneously, are present and in order. The complications that may occur after operation; what to do in order to prevent a patient clenching his teeth or the tongue falling back over the trachea; what to do if either of these accidents occurs, or if mucus, etc., enter the trachea. The

symptoms of hemorrhage and shock and wherein they differ; the rapidity with which patients under the influence of ether will be burned, if hot-water bags are placed in the bed without proper protection.

What instruction and cautions will you give in connection with the demonstration of preparing for and assisting with an intravenous infusion?

Why salt solution is used in preference to any other for intravenous infusion; why an intravenous infusion will stimulate the heart. The necessity to practise the strictest asepsis, to be sure that the scalpels are sharp, to provide a good light, to have the temperature of the solution exactly accurate; if a bandage is tied about the upper part of the arm to further the engorgement of the veins, to remove it after the doctor inserts the canula in the vein; to shut off the current before the last of the solution enters the tubing, and the complication that will result if this is neglected. The effect that salt solution of a different degree of concentration than .6 to .9 per cent. would have upon the blood-corpuscles.

CHAPTER XIII

HYGIENE

Define hygiene.

"Hygiene is the science of the preservation of health and prevention of disease."

What are the principal factors in maintaining health?

Cleanliness of the inside and outside of the body, and of all external surroundings; fresh air; sunlight; sufficient quantities of pure food and water; food that is properly cooked and not indigestible; proper clothing; well-regulated exercise.

What would you understand by internal cleanliness of the body?

That all waste products of the tissues and of food are properly eliminated from the body.

(a) What is about the normal amount of feces passed in twenty-four hours? (b) Of urine? (c) Of perspiration?

(a) 5 to 8 ounces. (b) 40 ounces. (c) 20 or 30 ounces.

State three important factors in stimulating the excretory organs of the body.

Exercise, proper food, and drinking sufficient water.

(a) How much fluid should be drunk daily under ordinary circumstances? (b) Is it better taken with or between meals? (c) Why? (d) What time of day is the drinking of water especially beneficial?

(a) About three pints. (b) Principally between meals; (c) if a large quantity of fluid is taken with

meals it is apt to over-dilate the stomach. (d) Before retiring and first thing in the morning.

(a) *What is necessary in order to keep the skin in a properly active and cleanly condition?* (b) *What kind of baths are the best under ordinary circumstances?* (c) *What kind of baths should people who take cold easily avoid?*

(a) A daily bath. (b) Cold, or warm followed by a cold plunge or shower. (c) Hot baths, or even warm ones, unless followed by a cold one.

Mention some places and things that it is particularly important to keep clean.

All cupboards where food, or dishes, or utensils for food are kept; refrigerators; all dishes and utensils used for food, especially those intended for the reception of milk; sinks; hoppers; water-closets; and all places where there are sick people.

Mention a common lack of cleanliness that may result in the infection of food.

Lack of care in screening houses in order to prevent the presence of flies, mosquitoes, etc.

What care should refrigerators receive?

They should be thoroughly washed, daily, with warm water and soap, or soap powder, and afterward with clear water; at least once weekly the drain pipe must be flushed with soda water followed by clear warm water. Refrigerators should be also aired daily, the airing being done before the fresh supply of ice is put in. Anything spilt should be wiped up at once.

Mention measures necessary to prevent air vitiation.

To have rooms and buildings sufficiently large to provide the required amount of air space for each occupant; to have proper ventilation, sewage, and

lighting and heating equipments, also, the buildings, their surroundings and the people inhabiting them must be clean.

What should be the minimum amount of space allowed per capita?

85 to 100 square feet of floor space, when the height of the room does not exceed 10 to 12 feet. A greater amount of space should be allowed in hospitals and in factories where the industries give rise to impurities.

Mention important points to consider in connection with ventilation.

(1) That the incoming air is pure; (2) that it does not enter the room with sufficient force to cause a draught (to prevent this in cold weather, the entering air must be directed upward); (3) that the inlet and outlet for the air are not exactly opposite to each other as, in such case, the fresh air will leave the room without diffusing through it.

Name common modes of artificial ventilation.

(1) The plenum or propulsion system, in which the outside air is drawn into a box and then propelled through shafts to the various parts of the building. (2) The extractive or vacuum system, in which the air is drawn from the rooms into shafts and then expelled outward. Both results are obtained by means of blowers or fans driven by steam or electricity.

Which system is generally considered the better?

A combination of the two.

Describe one method of obtaining slight constant ventilation in winter time in a room that has not been provided with ventilators.

Raise the lower sash three or four inches and place a board in the opening; the air enters between the

two sashes and is directed upward, thus preventing a draught.

How, in cold weather, can you thoroughly change the air in a room without danger to the patient?

Before opening the window, put extra blankets over the patient, leaving only her face exposed. If the bed is near the window, place a screen between them. If the weather is very cold or the disease from which the patient is suffering demands an even temperature, open a window in an adjoining room, instead of that occupied by the patient, and leave the door between the two rooms open.

How can you be sure that the air remains pure?

Leave the room from time to time, and notice on re-entering if there is any odor.

Mention some things that will use up the oxygen and render the air impure as well as the presence of people.

Combustion of gas, oil, candles, etc. The near presence of garbage cans, unclean hoppers, sinks, water-closets, improper or defective plumbing.

What is a common fault of ventilating systems?

Lessening the humidity of the air by heating, without adding moisture to it. Dry hot air is a mental excitant and irritant, also, it parches the membranes of the eyes, nose, throat, and lungs, thus laying a foundation for catarrh and bacterial infection.

To what are the ill effects associated with presence in an over-crowded, badly ventilated building due.

Lack of oxygen and interference with body heat regulation on account of the increase of temperature and humidity due to the giving off of heat and moisture from the bodies of those present. See page 370.

How do traps prevent the access of gas into the house?

When in working order, the trap is always filled with water, through which the gas cannot pass.

How will the traps lose their seal (become empty)?

By leakage in or around the trap; by the trap becoming filled with dirt or sediment; by evaporation.

To what is evaporation usually due, and how can it be prevented?

To disuse. By pouring oil or glycerine into the pipes when it is known that they will not be used for some time.

(a) To what is much of the clogging of pipes and traps of kitchen and pantry sinks due? (b) How can it be prevented?

(a) To an accumulation of grease. *(b)* By flushing the sink once or twice weekly with hot soda solution.

What are the sanitary requirements of house plumbing?

"The house must be connected directly by pipe with the common sewer. The piping in the house must be of iron, with screwed couplings, and in plain view. The drainage-pipe should have a drop one inch in every four feet and should be provided with a trap placed beyond all inside connections. The wash-bowls, bath-tubs, hopper, and water-closets must have tight joints and must be also provided with traps and trap ventilators. Soil-pipes must have ventilators extending at least two feet above the roof."

Mention one bad result of the continued inhalation of sewer gas.

Anemia, due to the effect of the gas on the blood.

What care should a privy receive?

A disinfectant and deodorant substance, such as chloride of lime, should be poured into the vault

daily; earth put in every time it is used; and it must be emptied frequently. Also it must be well ventilated.

Why is the disinfection of infected excreta of special importance when it is emptied into a privy?

Fluid excreta and, with it, bacteria will percolate considerable distances through some soils, and water emptying into a well or stream may flow through this soil.

Give two reasons why bedrooms so situated that they get the morning sun, are to be preferred.

The presence of the sun, while the beds are being aired, is of great benefit, and, in summer, it is a decided advantage not to have the sun in the afternoon, as the rooms are then cooler for the night.

What advantage has electricity as a method of lighting from a hygienic standpoint?

It does not use up the oxygen of the air nor add impurities to it, as do the other methods of artificial lighting.

What are the healthiest methods of heating houses?

Hot-water and steam systems.

What are the benefits and disadvantages of open fireplaces?

Open fireplaces are good ventilators, but they yield an unequal supply of heat and in cold weather will cause draughts; they are also expensive, as a large portion of the heat goes up the chimney.

What are the more common sources of contamination of drinking water?

The emptying of sewage into the stream from which the supply is obtained; subsoil water that has passed through infected soil; infection by drainage from cemeteries; lead pipes.

(a) *On what does the purity of rain water depend?*
(b) *Why?*

(a) On the locality. (b) Water is very absorbent and the rain will absorb the impurities of the atmosphere.

Mention some diseases that are often traced to an impure water supply.

Typhoid fever, dysentery, cholera, scarlet fever, and many of the diseases due to animal parasites.

How should suspicious water always be treated?

It should be boiled and filtered.

(a) *When is woollen underwear to be preferred?*
(b) *Why?* (c) *What should be the nature of its texture?*
(d) *Why?*

(a) In variable weather. (b) Being a non-conductor of heat, it tends to retain the body-heat; it also absorbs the moisture of sudation and thus prevents sudden chilling of the body. (c) It should be of an open mesh. (d) In order to allow of proper ventilation of the skin.

What material ranks next to wool in being a good non-conductor of heat?

Silk.

Mention some of the adverse conditions that may result from the wearing of ill-fitting shoes

"Flat foot," weak ankles, corns and other forms of callus.

Mention some of the adverse conditions likely to result from lack of exercise.

Poor circulation, faulty metabolism, lack of muscular tone.

What diseases are to be specially guarded against in the winter time?

Diseases of the respiratory system, and the acute infectious diseases.

What precautions should be taken in order to avoid diseases of the respiratory system?

Wear suitable clothing, avoid over-heated buildings, take cold baths daily, go out in the fresh air daily, and live in a well-ventilated building.

Mention common causes of such diseases.

Bacteria are a common active cause; local congestion, due to cold, the inhalation of dust, and other irritating matter, frequent predisposing causes.

Mention prophylactic measures that should be observed in malarial districts and give reason.

The presence of stagnant water in gutters, barrels, roof-drain pipes or any place whatsoever should be prevented or, when this is impossible, kerosene or other larvacide should be poured over the water or else living fish should be kept in it. Houses should be screened and people suffering with malaria should sleep under mosquito nets. The organism which cause malaria is transmitted from infected to uninfected persons by mosquitoes and these breed around standing water. Fish eat the eggs of the mosquitoes and kerosene destroys the larvæ.

(a) Why are outbreaks of acute infectious diseases supposed to be more common in winter than in summer?

(b) What does this teach?

(a) To the fact that in the winter people are more indoors, and, therefore, the overcrowding in the poorer sections of cities (where such outbreaks generally begin) results in greater lack of fresh air and cleanliness. *(b)* The necessity for fresh air.

(a) Which diseases are, as a rule, more prevalent in summer time, and (b) what prophylactic measures should be taken for their prevention?

(a) Diseases of the digestive tract, especially in

young children. (b) Careful feeding and attention to cleanliness and to the regulating of the bowels.

Mention some of the more important things that a "school nurse" should watch for in the pupils.

Symptoms of infectious diseases, conditions due to infesting of the body by animal parasites, symptoms of the presence of adenoids, of diseases of the eye, of defective vision and hearing, anemia, curvature of the spine; if their teeth are clean and in good order.

Mention two common causes of curvature of the spine.

Sitting or standing crookedly, and sitting at a desk that is either too high or too low.

How can curvature generally be corrected in a young child if recognized early?

By making it stand and sit properly, giving it a few well-directed gymnastic exercises daily, and food rich in mineral matter as oatmeal, eggs, milk, raisins, green vegetables.

To what is anemia most commonly due?

Lack of fresh air and proper food, other diseases.

Mention some things that are thought to promote the development of adenoids.

Colds in the head, the inhalation of dust and other irritating substances, sucking the finger or "satisfying nipples."

(a) Name one of the more common defects of the eye incident to school life, and (b) state some of the causes.

(a) Myopia. (b) A poorly lighted schoolroom, improperly placed desks, poorly printed text-books, glazed blackboards, or blackboards placed between lights.

How should the desks be placed?

So that the light will fall over the pupils' left

shoulders and from behind. The pupils should never sit facing the light.

What should a child be taught in order to prevent him contracting and causing infectious diseases?

Never to spit on the ground; to hold a handkerchief in front of his face when coughing or sneezing; not to use public drinking cups or towels; not to put pencils, his fingers, money or the like in his mouth; not to wet his fingers in his mouth when turning the leaves of books, to wash fruit before eating it; not to take a bite of another child's candy, fruit, etc., nor to eat anything which looks dirty or upon which he has seen flies resting or which has fallen on the ground; to gargle his throat when it is sore or when he has a cold.

CHAPTER XIV

BACTERIOLOGY

Nature and Divisions of Bacteria. Where Found. Favorable Conditions for Development. Methods of Destroying Disinfectants.

What are bacteria?

Microscopical, unicellular organisms that have both vegetable and animal characteristics.

Mention some ways in which bacteria differ from yeast.

In size, and in their method of reproduction. Bacteria are smaller than yeast and multiply by fission or division. Yeast multiply by budding.

State some points of differences between the various classes of bacteria.

Some produce disease; some, suppuration in wounds; some, putrefaction; some, fermentation; they have different shapes; they require different conditions for their subsistence and development; some have independent motion; some have color; some can be stained with certain dyes; others will cause the gelatine in which they are planted to melt; and, one of the most important distinctions, some of them have spores.

What name is given to the bacteria that produce disease and infection in wounds?

Pathogenic.

What are those called which do not produce disease or suppuration in wounds?

Non-pathogenic.

What are those called which produce putrefaction and similar changes in organic matter?

Saprophytes.

(a) *What are moulds called?* (b) *Yeasts?*

(a) Hyphomycetes. (b) Blastomycetes.

State the different shapes of bacteria, and the names of the classes that are so formed.

Bacteria are either spheroidal, ovoidal, rod-shaped, or spiral. The first and second are called cocci—singular coccus,—the third, bacilli—singular bacillus;—the last, spirilli—singular spirillus.

How have the more common cocci been classified with regard to their mode of grouping in media when they remain joined after fission?

As diplococci, those linked in pairs; streptococci, those which form chains; staphylococci, those forming grape-like clusters.

(a) *What name is given to bacteria that require oxygen for their development?* (b) *To those which grow best in the absence of oxygen?* (c) *To those which develop equally well under either condition?*

(a) Aërobes. (b) Anaërobes. (c) Facultative aërobes or anaërobes.

What are bacteria which produce color called?

Chromogenic.

What are spores? What is their function?

They are seen as round or ovoid, highly refracting bodies in some bacteria. It is thought that spore-formation is not a method of reproduction, but a means of resisting conditions that destroy the cells giving rise to the spores. The reasons for this assumption being (1) that a single bacterium forms, as a rule, but one spore, (2) spore-formation is not common

among bacteria, (3) spores are able to resist the influence of disinfectants and of temperatures and other conditions that destroy bacteria.

Why is it necessary to use stronger disinfectants for germs that have the power of forming spores than for the non-spore-bearing ones?

Spores have much greater power of resistance than bacilli.

Name (1) a class of animal organisms similar to bacteria; (2) a prevalent disease caused by one variety.

Protozoa. Malaria.

Name some germs that produce inflammation.

Staphylococcus pyogenes aureus, streptococcus pyogenes aureus, bacillus coli communis, bacillus of tetanus, streptococcus of erysipelas, diphtheria bacillus.

Where are bacteria found?

They are almost omnipresent. They are in the air, though decreasing in the upper strata; they are in the ocean to a considerable depth; in all running and standing water, especially in shallow streams and stagnant pools, in the soil, to the depth of about four feet; they are in the dust; upon practically all surfaces exposed to the air and in ducts and orifices of the animal body communicating with the exterior.

Mention some places in which they are particularly apt to be present in large numbers.

Wherever there is dirt, associated with moisture, where the direct rays of the sun do not enter, where there are any infectious diseases or suppurating wounds, in the glands of our skin, in our hair, and under our nails.

Why is dirt likely to favor the growth of germs?

It may provide organic matter in which bacteria will find favorable conditions for their sustenance.

What characteristic of the tubercle bacillus helps to make tuberculosis such a prevalent disease?

It can withstand drying for a long time.

Mention a fact regarding typhoid bacilli that is partly accountable for the prevalence of typhoid.

Typhoid bacilli may propagate in the gall and urinary bladders for years after a person has had typhoid and be passed in the stools and urine.

Define the words "sterile," "asepsis," "antiseptic," "disinfectants," "sterilization."

Asepsis and sterile mean freedom from microorganisms. An antiseptic is a substance that will retard the growth and development of bacteria, but not destroy them. Disinfectants are chemical substances that destroy germs. Sterilization signifies any process by which germs are killed, but the expression is used more especially when heat is the medium used.

What disinfectant has nature provided?

The sun.

(a) In what time will the tubercle bacillus be destroyed, if exposed to the direct rays of the sun? (b) The bacillus of diphtheria?

(a) In five to seven hours. (b) In twenty-four hours.

Name the four processes of sterilization by heat.

Boiling, the use of streaming steam, of streaming steam under pressure, of hot air.

How long an exposure to the influence of boiling water is necessary to kill spore-bearing bacteria?

It depends on the object to be sterilized; the majority of germs will, if the surface of the substance is smooth and non-absorbent, be killed in a very few minutes; but if it is at all absorbent it will require half an hour's exposure and, if it is thick, fractional sterilization will be necessary.

Why should soda be added to the water in which instruments are sterilized?

It prevents their rusting and it hastens sterilization.

Why are dressings intended for surgical purposes when sterilized in steam not under pressure steamed twice or thrice?

Steam not under pressure does not always kill all spores; therefore, time is given the spores to develop, and the sterilization is then repeated.

What is the approximate temperature of steam under a pressure of 15 pounds pressure to the square inch? 250° F. or 120° C.

How long will it take at this temperature to kill bacteria and spores?

Fifteen minutes, but time must be given for the heat to penetrate to the center of the substance.

Why is it necessary to expel the air from the sterilizer when sterilizing by steam under pressure?

Air being a poor conductor of heat forms dead spaces around the articles to be disinfected and prevents the steam from coming in contact with them.

Why is glassware broken by sudden heating or cooling and by contact with metal or other hard solid during sterilization?

Heat expands and cold contracts glass and sudden changes in temperature cause it to expand or contract unevenly. Hard solids prevent expansion at the point of contact.

(a) *When liquids are sterilized in an autoclave, what must not be done at the conclusion of the process?*

(b) *Why?*

(a) The pressure must not be released until the apparatus has cooled. (b) The condensed steam will cause a diminished pressure which will make the

superheated liquids boil so forcibly that they will boil over, blow out the stoppers, or burst the flasks.

Why is the usefulness of dry heat very limited?

Because it requires the exposing of objects to a temperature of 150°C. – 300°F. for one hour to insure the killing of spores, and there are few article that will not be ruined by this degree of heat.

Mention points to remember when sterilizing rubber. Give reasons.

Rubber must not be sterilized longer than necessary; it must not be boiled, as instruments are, in water containing soda; for heat and soda injure it.

Name the two gases most commonly used for disinfection.

Formaldehyde and sulphur dioxide.

What are the advantages and disadvantages of formaldehyde gas?

(a) It is not poisonous; it does not injure colors, fabrics, or metals, and can be thus used in the most richly furnished room without fear of injury to its contents. (b) Unless combined with heat and moisture, formaldehyde has very limited powers of penetration; it is of no value as an insecticide, except for mosquitoes, which it will kill in the strengths and time necessary for bacterial disinfection.

What are the common methods of disinfecting with formaldehyde gas, when there is no autoclave or lamp for generating it?

(1) For a moderate sized room—about 1000 cubic feet—place one and one-half pounds of quicklime in a wide shallow pan and pour one-half liter of formalin forty per cent. over this. The heat generated by the slaking of the lime causes the volatilization of the formalin. (2) Pour a forty-per-cent. solution of

formalin over crystals of permanganate in the proportion of 100 cc. to 50 grams of the crystals, using one pint of formalin for every 1000 cubic feet of space to be fumigated. The solution must be put in a five-gallon pail and the floor under and around the pail well protected, as violent boiling occurs as soon as the crystals and solution come in contact. (3) Suspend sheets on lines strung across the room, allowing one large sheet for every five ounces of solution to be used, and using ten ounces of formalin—40%—for every 1000 cubic feet. After the room is sealed, spray the sheets with the solution.

What precaution can a nurse take to avoid having her throat and eyes irritated by the gas while spraying?

Wear glasses to protect the eyes and tie a handkerchief across the nose and mouth to avoid inhaling the gas.

How long should a room be left closed for methods 1 and 2? For method 3?

12 hours. 24 hours.

Is the spraying method very effectual?

No, it should be used only for small rooms.

When disinfecting with formaldehyde gas, what must be remembered regarding temperature and moisture?

(1) That the disinfecting power of the gas is much greater in a high temperature, and that rooms to be disinfected should therefore be heated (the gas condenses at 20° C. to solid polymeric paraform). Moisture is absolutely essential to obtain the full disinfecting power of the formaldehyde and, therefore, in dry weather, unless the apparatus used supplies watery vapor, a basin of boiling water should be placed in the room before evolving the gas.

For what is sulphur fumigation applicable?

To kill vermin, *e.g.*, bed bugs.

Mention some of its disadvantages as a disinfectant for rooms, etc., infected by bacteria.

It does not kill spores; it injures metals, colors, and many fabrics; even cotton and linen goods will tear readily after being exposed to its fumes.

What is the easiest and cheapest way of burning sulphur for fumigation?

Put the sulphur in an iron pot, place this in a pan of water, make a little hole in the center of the sulphur and pour in some alcohol, set fire to the alcohol.

How much sulphur is required to disinfect a room having 1000 cubic feet of air space?

Five pounds.

How is a room prepared for fumigation?

All cupboards and drawers are opened; furniture moved away from the walls; curtains, carpets, etc., hung on lines; window shades lowered; and everything arranged so that all its surfaces will be exposed to the gas for it does not penetrate even thin fabrics. All cracks, crevices, keyholes, registers, and other openings are sealed by pasting paper over them.

(a) *What kind of paper should be used for this purpose?* (b) *Why?*

(a) White paper. (b) Colored or newspaper is apt to stain the woodwork.

Chemical Solutions

In deciding the value of a disinfectant, what points are to be considered?

Whether it will kill spores as well as the bacteria; the number of things for which it can be used and its limitations; its cost.

State an advantage and a disadvantage of alcohol 70% as a disinfectant.

(a) It cleanses, as well as disinfects. (b) It is expensive; it cannot be relied upon to kill spores.

Why does alcohol not disinfect if used stronger than 70%?

Stronger solutions will coagulate any albuminous substances surrounding the bacteria, and thus form a protective covering for the germs.

State the advantages and disadvantages of bichloride of mercury.

Its advantages are that, in strengths easy to obtain, it kills spores as well as bacteria, and it is not as expensive as many of the other disinfectants. Its disadvantages are that it is exceedingly poisonous, it corrodes metal, discolors white goods, and it unites with albumin and other matter in excreta, forming compounds that are useless for disinfecting.

How long is it necessary to expose matter to bichloride of mercury 1-1000 in order to render it sterile?

About one half hour.

Why is iodine a very valuable skin disinfectant?

It penetrates deeper than other disinfectants.

Mention some of (1) the advantages and (2) disadvantages of carbolic acid.

(1) It does not injure white clothing, and metals.
(2) It cannot be depended on to kill spores; its value as a disinfectant is therefore limited to non-spore-bearing bacteria. Another disadvantage is that it is very corrosive.

What care must be taken when making carbolic solutions? Why?

To shake the bottle until all globules disappear.

They will burn any tissue with which they come in contact.

What quantity of carbolic is necessary to disinfect the urine and excreta of typhoid patients?

Sufficient to make them 5%.

How long must they stand before being emptied?

At least one half hour.

What is the comparative strength of tricresol and lysol to carbolic?

They are about three times as strong.

What is the strength of creolin as compared with carbolic?

It is about equal.

(a) What precautions should be taken when diluting creolin? (b) Why?

(a) The water should not exceed 98°F. and it must be put into the flask first. (b) If the water is too hot, the drug will be too thoroughly dissolved and its action lessened.

What is formalin?

A solution of one of the polymeric forms of formaldehyde, especially paraformaldehyde.

State its advantages and disadvantages as a disinfectant.

It is a strong germicide and also a deodorant; it injures very few articles, and its action is not retarded by the presence of albuminous substances as is bichloride. Its disadvantages are its irritating gas, and the ease with which it evaporates and, in cold weather, forms a precipitate.

Name two metals that hot formalin will injure.

Iron and steel.

What per cent. formaldehyde does a saturated solution of formalin contain?

About 40 per cent.

What per cent. formalin will be equivalent in strength to 1 : 1000 bichloride?

4 per cent,

How long will it take to deodorize and to sterilize typhoid stools with a 4% solution, using sufficient solution to equal the bulk of the stool?

The stool will be deodorized instantly and rendered sterile in ten minutes.

For what purpose is permanganate of potash chiefly used?

For cleansing the skin and, in some countries, for the purification of water.

Why is its use very limited?

(1) It is rendered inert by organic matter; therefore, if used for such purposes as the disinfection of urine and stools, it would require to be used in such quantities that it would be an excessively expensive method of disinfection. (2) It stains fabrics.

How can the stains of permanganate of potash be removed?

By washing with oxalic acid, muriatic acid, or lemon juice.

How is slaked lime prepared?

By mixing lime and water in the proportion of one pint of water to two pounds of lime.

What is milk of lime?

Slaked lime diluted with four times its volume of water.

For the disinfection of what articles are slaked lime and milk of lime chiefly used?

Excreta and privy vaults. See page 197.

Why is it necessary to use freshly slaked lime?

If slaked lime is exposed to the air for more than

a few hours, it is changed to carbonate of lime, which is not a disinfectant.

What is the chief use of chlorinated lime?

It is sometimes used to disinfect excreta and bed-clothes; it is often used to remove stains from white fabrics.

What further treatment will fabrics so disinfected or bleached require? Why?

They will need to be thoroughly washed in warm water. Unless the lime is entirely removed the fabric will be destroyed.

How can you tell if chlorinated lime is fresh?

Dissolve a little in water; if the water becomes turbid, the lime is useless.

How much chlorinated lime is it necessary to use to disinfect excreta?

Of the powder, sufficient to make the mass a four per cent.; of the solution, the same amount of four per cent. solution as of excreta.

What is Labarraque's solution?

An aqueous solution of several chlorine compounds of soda.

For what is it used?

For the same purposes as chlorinated lime, but as it is more expensive and less efficient than the lime it is not much used.

How is the efficiency of the majority of disinfectants increased?

By using them hot.

Is ice a disinfectant? Why?

No, it kills neither spores nor bacteria, but only retards their development.

How should the sputum of patients suffering with tuberculosis and diphtheria be treated?

It should be received into paper sputum cups or into gauze or paper handkerchiefs, and the handkerchiefs put at once into a paper bag. The sputum cup and bag should be burned.

What precautions should a nurse take against personal infection when irrigating the throat of a child suffering with diphtheria?

She should wear glasses to protect her eyes, and tie a piece of gauze in front of her mouth and nose; so that if, as often happens, the child expectorates violently during the process, she will not inhale any particles of membrane or discharge.

How can a nurse disinfect herself after taking care of a patient suffering with a contagious disease?

Take a hot 1 to 3000 bichloride bath followed by a sponge with alcohol, wash her hair with bichloride, and change all clothing, leaving that worn while on duty in the room to be fumigated.

What precaution should a nurse take against getting her hair more infected than absolutely unavoidable?

She should wash her hair frequently, and, while in the sick-room, keep it entirely covered with a cap.

What difference is there in the method of disinfecting the hands after touching a patient suffering with a contagious disease, and when preparing for a surgical dressing?

In the former case, the hands are washed in the disinfectant first and with water and soap last; in the latter case, the order of procedure is reversed.

How must the hands be prepared for disinfection?

They must be thoroughly scrubbed with hot water and green soap, special attention being paid to the nails.

Why is hot water more efficient than cold?

It removes sebaceous matter from the skin and skin glands much more thoroughly than the latter.

Mention some methods of disinfecting the hands and arms when preparing to assist at operations?

After scrubbing the hands and the arms to above the elbow with soap and hot water for five minutes and rinsing them in sterile water; (1) wash them for three minutes with a lather made of equal parts of chloride of lime and carbonate of soda, rinse in sterile water, and then immerse them in bichloride of mercury 1 to 1000 for three minutes. (2) Immerse the hands and arms in a solution of permanganate of potash (two ounces to four quarts of water), then in a solution of oxalic acid (eight ounces to four quarts of water), and, finally, in bichloride of mercury 1 to 1000. (3) Soak the hands and arms in alcohol 50% for two minutes, and then in bichloride of mercury for three minutes. (4) Scrub the hands and arms with equal parts of chlorid of lime and carbonate of soda, rinse them in sterile water, soak them in a one-half per cent. alcoholic solution of iodine.

In selecting a room in which to isolate a patient suffering with a readily communicable disease, such as scarlet fever, what points will you consider?

That the room is as isolated as possible, that it is one in which there will be plenty of sunlight, that it will be easily ventilated, and, if possible, that it is adjoining a bathroom that need not be used by other inmates of the house.

What would you do if you found a patient suffering with scarlet fever in a room in which there was a quantity of fancy articles and superfluous draperies that interfered with the light and airing?

Remove all that were not of use or necessary to

prevent the room having a bare appearance, and put them in a drawer or cupboard *in the room*, and, at the termination of the disease, fumigate them with the rest of the furnishings when fumigating the room.

How should you treat sheets when, and after, removing them from the bed of a patient suffering with an infectious disease?

Keep them rolled together as much as possible—so that any desquamated skin, etc., that may be on them will not be scattered—and put them at once into a receptacle. In a house, it is well to put them into a pail in which they can be kept covered with water and, as soon as possible, boiled.

What will be required for taking a throat culture? Mention the directions usually given for doing so.

A tube of sterile culture medium, a tube containing a sterile swab on a rod, a flame in which to sterilize the top of the culture tube. Place the patient in a good light and, if a child, have it properly held. In cases where it is possible to get a good view of the throat, depress the tongue and rub the cotton swab gently, but firmly, over any visible exudate, revolving the rod between the fingers, so as to bring all portions of the swab in contact with the mucous membrane or exudate. In other cases, including those in which the exudate is confined to the larynx, pass the swab back as far as possible, avoiding the tongue, and rub it freely, as described above, against the mucous membrane of the pharynx and tonsils. Withdraw the cotton plug from the culture tube, holding it so that the portion withdrawn from the tube does not come in contact with the fingers or any other object. Insert the swab and rub it gently, but thoroughly, back and

forth over the entire surface of the medium. At least half a minute should be given to this operation, the rod being revolved so as to bring all portions of the swab in contact with the surface of the medium. Do not allow the swab to touch anything except the patient's throat and the medium. Do not push the swab into the surface of the medium nor break the surface of the latter in any way. Replace the swab in its own tube, flame the top of the culture tube, insert the plug. Attach a label to the tube and on this write the patient's name, the date, the location from which, and why, the culture was taken and any other necessary information. The swab must be burned.

(a) *What are toxins?* (b) *What is meant by saying that toxins are specific?* (c) *What is the result of the specificity of toxins? Give example.*

(a) Poisonous, nitrogenous substances produced by certain bacteria as the result of their metabolic processes. (b) Each germ produces toxin different from that produced by any other organism. (c) The symptoms arising as the result of poisoning by any one kind of toxin differ from those produced by all others; *e.g.*, the difference between the symptoms of typhoid fever and diphtheria.

What is meant by immunity?

Security against any particular disease.

What is the difference between natural and acquired immunity?

Natural immunity is the resistance which some animals have against certain diseases; *e.g.*, all animals will not contract the same diseases as man and man does not become infected by some diseases that spread rapidly among cattle; also some races are more susceptible to certain diseases than others. Acquired

immunity is that gained by an attack of the disease or by the use of antitoxins or vaccines.

For difference between antitoxins and vaccines, see page .

What is the difference between active and passive immunity? Give reason for names.

Active immunity is that gained by an attack of the disease in question or by the use of vaccine. It is called *active* because the individual's own cells produce the antitoxin which gives immunity. Passive immunity is that secured by the use of an antitoxin. It is called *passive* because the individual is the recipient of an antitoxin produced by the cells of some other animal and his own cells take no part in its formation.

CHAPTER XV

ANATOMY AND PHYSIOLOGY

The Bones

Name the two forms of bony tissue, and state in what part of the bone each is found.

Dense or compact, spongy or cancellated. The former comprises the outer part of the bone, the latter the inner.

Which of the two enters most largely into the composition of the long bones?

The compact; the long bones contain very little cancellated substance.

Name the canal that forms the centre of the long bones. What specific substance does it contain?

The medullary canal. The marrow.

What is the membrane which surrounds the bones called, and what is its purpose?

The periosteum. The bones depend largely upon its blood-vessels for their nutrition.

What are the Haversian canals?

Channels which run longitudinally through the bone and contain the blood-vessels that supply the interior of the bone with blood.

What are the lamellæ, lacunæ, and canaliculi?

The lamellæ are the bony fibres or framework of the bony tissue; the lacunæ, the spaces between the lamellæ; the canaliculi, the small canals that connect the lacunæ and the Haversian canals.

What is the comparative proportion of animal and mineral matter in the bones of adults?

There is about two-thirds mineral matter to one-third animal matter.

What is the difference between the comparative proportion of salts and animal matter in the bones of children, adults, and the aged?

Children's bones contain more animal matter and less mineral substance than adults'; the aged have more mineral and less animal matter in their bones than people of middle age.

Mention two purposes of the marrow.

It serves (1) to support blood-vessels, nerves, etc., (2) as a location for the formation of blood corpuscles.

How are bones classified according to their shape?

As long, flat, short, and irregular.

Of how many bones does the adult skeleton consist?

200.

Name the bones of the skull.

Occipital, two parietal, frontal, two temporal, sphenoid, ethmoid, two nasal, two lacrimal, two turbinated, vomer, two palate, two malar, two superior maxillary, and one inferior maxillary.

Which of these bones form the orbital cavities?

Frontal, ethmoid, sphenoid, lacrimal, superior maxillary, palate, and malar.

Where are the nasal bones situated?

They form the bridge of the nose.

Where is (1) the vomer? (2) the turbinated bones?

At the posterior portion of the cartilagenous division between the two sides of the nose. At the back of the nose.

Where is the sphenoid bone, and what is its purpose?

Behind the eye. They help to form the orbital cavity and the floor of the cranium.

Describe, and state the location of, the ethmoid.

It is a small, exceedingly light cancellous bone, situated between the orbits, at the upper part of the posterior wall of the nose. It is joined at the back of the base of the skull.

What is the mastoid bone?

It constitutes the posterior portion of the temporal bone.

What name is given the hollow spaces, above the eyes, in the frontal bone, that open into the nose?

The frontal sinuses.

What is the name of the opening in the skull through which the spinal cord passes?

The foramen magnum.

Name the articulations between the bones of the skull, and state which bones each one connects.

The coronal suture connects the frontal and parietal bones; the lambdoidal, the parietal and occipital; the sagittal, the two parietal.

What are the open spaces that are present in the skull at birth called?

Fontanelles.

Name the bones of the ear, and say where they are situated.

The malleus, or hammer; the incus, or anvil; the stapes, or stirrup. The hammer is in the middle ear, and is attached to the drum; the anvil is attached to the hammer and to the roof of the middle ear chamber; the stirrup is attached by its small end to the anvil, and its broad part, or *footplate*, rests at the edge of the opening between the middle and internal ear.

Where is the hyoid bone, and what is its purpose?

It is situated in the neck, about on a level with the lower edge of the lower jaw. It serves for the attachment of the muscles of the tongue and the ligaments of the larynx.

Give a brief description of the spine.

It consists of 33 small irregular bones, called vertebræ, joined by ligaments. In front, the vertebræ consist of a solid portion, the *body*; behind they form into an arch; in the center there is a cavity through which the spinal cord passes; each arch has seven processes, four articular, two transverse, and one spinous process. The vertebræ are separated from each other by discs of fibro-cartilage which act as springs, and serve to break the force of any sudden jar, that, otherwise, might result in injury to the brain. The spine is divided into five parts: the first seven vertebræ are called the cervical vertebræ; the twelve following, the dorsal; the next five the lumbar; the next five the sacrum, and the last four the coccyx. In adult life the sacrum and coccygeal vertebræ become ossified and form but two bones. The cervical vertebræ are smaller than the dorsal, and the lumbar larger. The spine has three distinct curves: forward at the neck, backward at the thorax, and forward again in the lumbar region.

What are the atlas and axis? Describe them.

The two first bones of the cervical vertebræ. The atlas, so called because it supports the head, has less body than the other vertebræ; it is, practically, a ring divided in the centre by a transverse ligament. The spinal cord passes on one side of this ligament and the other—the front section—is occupied by the bony projection which arises from the front of the axis. It

is around this projection—the odontoid process—that the atlas rotates, when the head turns from side to side.

Name the bones that form the thorax and state their position.

The twelve dorsal vertebræ at the back, the twelve ribs at the sides, the sternum in front.

How many ribs are there and what difference is there in their attachment?

24;—12 on either side. The first 7—the true ribs—are attached behind to the dorsal vertebræ and in front to the sternum. The next 3—the false ribs—are likewise attached to the vertebræ, but in front each rib is attached to the cartilage of the rib above it. The last 2—floating ribs—are attached to the vertebræ, but have no attachment in front.

State the number and names of the bones forming the pelvis.

4. The sacrum and coccyx behind, and the two innominate bones forming its anterior and side walls.

Name the divisions of the ossa innominata.

The ilium, ischium, and os pubis.

What is the upper border of the ilium called?

The crest of the ilium.

What is the anterior portion of the crest called?

The anterior superior spine of the ileum.

What is the point of meeting of the two innominate bones called?

The symphysis pubis.

What is the acetabulum?

The cup-shaped depression formed by the ilium, ischium, and os pubis, into which the head of the femur fits.

State how many bones enter into the formation of each of the upper extremities, and their names.

32. The clavicle, scapula, humerus, radius, ulna, the 8 carpus bones (e.g., the scaphoid, semilunar, cuneiform, pisiform, unciform, os magnum, trapezoid, and trapezium), 5 metacarpus bones, and 14 phalanges.

With what bones does the humerus articulate?

The scapula, radius, and ulna.

What part of the scapula is called the acromion process?

The flat projection extending from the spine of the scapula and overhanging the shoulder joint.

What is the glenoid cavity?

The cup-shaped depression in the scapula into which the head of the humerus fits.

Name the different parts of the humerus and state their location.

The head, the rounded part at the upper end; the anatomical neck, the constriction below the head; the greater and lesser tuberosities, two prominences, one on either side the bone, below the anatomical neck; the surgical neck, the constriction below the tuberosities; the shaft, the long part of the bone; the condyles, the prominences at the lower end of the bone.

With what bones does the radius articulate?

The humerus, ulna, scaphoid, and semilunar.

What is the olecranon process?

The process at the upper end of the ulna, which forms the head of the elbow.

How are the carpal bones placed?

They are in two rows, four bones in each row.

How many phalanges are there in each finger, and how many in the thumb?

Three in each finger and two in the thumb.

Name the bones of the thigh and leg.

The femur, tibia, fibula.

Name the different parts of the femur and their location.

The head, the prominence at the upper end; the neck, the constricted portion below the head which serves to keep the thigh bones separated from the trunk; the greater and lesser trochanter, the two prominences just below the neck; the shaft, the long part of the bone; the condyles, the prominences at the lower end of the shaft which rest upon the tibia and enter into the formation of the knee joint.

What are the two prominences at the head of the tibia called?

The inner and outer tuberosities.

Name the projection at the lower end of the tibia?

The inner malleolus.

Name the projection on the lower end of the fibula.

The outer malleolus.

Which of the two bones—tibia or fibula—enters into the formation of the knee joint?

The tibia.

Mention the number of bones in the foot and their names.

26. 7 tarsus bones (astragalus, os calcis, navicular or scaphoid, cuboid, internal cuneiform, middle cuneiform, and the external cuneiform), 5 metatarsus bones, 14 phalanges.

Which of these bones is the largest and where is it?

The os calcis; it forms the heel.

What joint do the tarsus bones form?

The ankle.

What part of the foot is formed by the metatarsus bones?

The instep.

The Joints

What tissues enter into the formation of joints?

Bone, cartilage, ligaments, and synovial membrane.

Name the different varieties of joints and give examples.

Immovable joints, as the sutures of the skull joints with limited motion, as the joints between the bones of the pelvis; freely movable joints, as the elbow. The movable joints are further subdivided into gliding joints, as between the small bones of the wrist and ankle; ball-and-socket joints, as the hip and shoulder joints; hinge joints, as the knee and elbow; pivot joints, those which permit rotation, as between the radius and ulna.

Name and explain the different kinds of movements of which joints are capable.

Flexion: a limb is flexed when an angle is formed in it through the bending of a joint; extension: the angle is decreased or obliterated; abduction: the drawing of the limb away from the middle line of the body; adduction: bringing it toward the middle line; circumduction: the turning of the limb so that it describes a conical surface; rotation, the turning of a limb on its own axis.

State the purpose and location of synovial membranes.

They secrete a viscid fluid, called *synovia*, which acts as a lubricant and prevents friction between surfaces, covered with the membrane, that move upon each other. They are found more especially covering the bones of joints, between tendons and bone, muscles and bone and between heavy muscles.

What are bursæ?

Sacs composed of synovial membrane.

The Muscles

Mention some of the uses of muscles.

Muscles form a covering for the bony skeleton, and give shape and contour to the body; they enter into the structure of the viscera; and are one of the principal agents in producing active movements.

Name the different kinds of muscle tissue and state where they are found.

(1) Plain muscular tissue, known also as unstriated, non-striated, visceral and involuntary. This constitutes a large portion of the substance of many of the internal organs. (2) Striped muscular tissue, called also striated, skeletal, and voluntary. This forms the muscles which cover and are attached to the skeleton. (3) Cardiac, striped, involuntary muscular tissue. This constitutes the muscular portion of the heart.

Why is skeletal muscle tissue called voluntary, and visceral and cardiac, involuntary?

Movements of the skeletal tissue can, normally, be controlled by the will, but those of the visceral and cardiac tissue cannot.

Give a brief description of the structure of plain muscular tissue.

It is made up of elongated cells, varying from $\frac{1}{800}$ to $\frac{1}{300}$ of an inch in length, and consisting of a delicate elastic outer membrane that is filled with muscle plasm and a nucleus. These cells are placed side by side and end to end, and cemented together in variously shaped bundles. These bundles are both separated and held together and to other tissues and membranes by areolar tissue.

What is the nature of muscle plasm? What is it called? Why?

It appears to consist of minute fibrils and a granular substance known as *sarcoplasm*. The plasm is known as the contractile substance, because the power of contraction which characterizes muscle tissue is due to the contraction of its fibrils.

Give a brief description of the structure of striped muscular tissue.

It is composed of slender tube-like fibers about an inch in length and $\frac{1}{500}$ of an inch in diameter. The walls of the fibers are composed of an exceedingly thin transparent, elastic membrane called the *sarcolemma*. The fibers are filled with muscle plasm which resembles that of plain muscular tissue except that the fibrils are striped. The muscle fibers are, with numerous blood-vessels and nerves, held together in bundles by an exceedingly delicate areolar tissue and the bundles are likewise bound together to form muscles of varying shapes and lengths.

Mention some points of difference between cardiac and skeletal muscle tissue.

The action of cardiac tissue is involuntary, its fibers are shorter, the bundles into which the fibers are bound are nearly square, and they are held together with branches or offsets of the fibers, no sarcolemma has been proved to exist.

What is a muscle?

An organ the essential part of which is a mass of striated muscular tissue, prolonged at its opposite ends or margins by cords, bands, or sheets of fibrous tissue which are fastened to other structures, usually bones.

To what special characteristics does muscle tissue owe its power of producing movement?

Irritability, contractility, extensibility, elasticity.

Define these terms.

Irritability signifies the power of responding to stimuli; contractility, the power of contracting or shortening; extensibility, capacity for being extended; elasticity, susceptible of being stretched or compressed and then assuming the original shape.

By what is muscle tissue irritated?

Nerve impulses.

What will cause a limb to become flexed?

Stimulation of the flexor muscle or muscles attached to the limb, in consequence of which the muscle contracts and pulls on the tendons inserted in the bone, thus drawing it up.

What is the nature and result of the chemical changes that take place in muscle as the result of contraction.

The exact nature of the changes is unknown beyond that they consist of splitting and oxidation which causes the complex compounds in the substance of muscle (primarily the glucose and glycogen) to be broken into simpler ones (as carbon dioxide, lactic acid, and other waste products) with the production of heat.

What is meant by the origin and insertion of muscles?

The origin of a muscle is its attachment to a part which it moves but little, if at all; its insertion, the attachment to a part which it does move.

What muscle covers the forehead and top of head?

The occipito-frontalis.

Name the large shoulder muscle; the two chief muscles of the arm; those of the forearm.

Deltoid. Biceps and triceps. Flexors, extensors, pronators, supinators, abductors, adductors.

What muscle divides the thoracic from the abdominal cavity?

The diaphragm.

What muscles form the buttocks?

The glutei muscles.

Cartilage, Fibrous, Adipose, and Lymphoid Tissues.

What is cartilage and where is it found?

Cartilage, commonly known as gristle, is an exceedingly tough, strong and, except the white variety, elastic tissue. It is found chiefly in the joints, in the walls of the thorax, and in various tubes (such as the air passages, nostrils, and ears) which are to remain permanently open. In the young fetus, the greater part of the skeleton is cartilaginous.

State the names and nature of the different forms of fibrous tissue.

(1) Areolar tissue, present in nearly all parts of the body, as a filmy tenacious network, holding various tissues together. (2) White fibrous tissue, a shiny, tough, pliant, but not elastic, tissue. (3) Yellow fibrous tissue, a tough, elastic tissue.

What are ligaments, tendons, or sinews, fascia, aponeuroses?

Ligaments are strong, flexible bands of fibrous tissue which serve to hold bones together at their articulations. Tendons are white, glistening fibrous cords which attach muscles to bones. Fascia are broad sheets of fibrous tissue; *e. g.*, the palmar fascia covering the palms of the hands, the plantar fascia covering the soles of the feet and the areolar tissue holding the skin to the underlying tissue. Aponeuroses are flat, wide fibrous bands which serve to connect muscles to each other.

Give examples of lymphoid tissue.

The tonsils and the tissue constituting the chief substance of the spleen and lymph glands.

What are the principal purposes of adipose (fatty) tissue?

(1) It acts as a store of energy material for the body, for, when the system requires matter for the production of heat, fat can be oxidized. (2) The fat under the skin, being a non-conductor of heat, prevents the too rapid loss of heat through the skin. (3) Fat fills spaces in the tissues and thus affords support for, and prevents pressure on, delicate structures such as blood-vessels and nerves. (4) Fat is collected in large masses around certain organs, as the kidneys, and helps to hold them in place.

Mention some of the uses of the skin.

It serves as a covering for the delicate internal tissues; it is a most important factor in heat regulation; it is a sense organ; an excretory organ; to a slight extent, an absorbing organ and a respiratory organ. In frogs and reptiles, the skin is an important respiratory organ, but in man less than $\frac{1}{2}\%$ of the oxygen supply enters through the skin and even less CO_2 leaves the body in this way.

What is the derma, and what is the epidermis?

The derma, or cutis vera, is the *true skin*, in which are imbedded the nerves, blood-vessels, hair, hair follicles, sweat glands, sebaceous glands, and a number of small projections, termed papillæ, in which are situated the nerve endings which give rise to the sense of touch. The epidermis is the layer of epithelial cells which form a covering for the true skin; it contains neither blood-vessels nor nerves.

What are the sebaceous glands, and what is their function?

Small glands, the ducts of which open upon the surface of the skin, usually at the base of a hair follicle.

They secrete an oily substance which keeps the skin and hair soft and prevents undue loss of heat.

What are the sudoriferous or sweat glands and what is their office?

Small tubular glands, situated in the true skin and subcutaneous tissue, the ducts of which open upon the surface of the epidermis. They separate waste matter, principally water, from the blood and excrete it in the form of perspiration.

What is the chief use of perspiration?

It is one of the principal means of preventing heat accumulating in the system; every gram of water evaporated takes about 0.5 of a calory of heat from the body.

What is meant by the expression insensible perspiration?

Perspiration that evaporates as it is thrown off without our being sensible of its presence.

About how much such perspiration is there in a day?

From thirty to forty ounces.

Of the heat removed from the body, about what percentage is given off by radiation from the skin and the evaporation of the water of perspiration?

Eighty-eight per cent.

What are mucous membranes?

The soft, red, vascular tissue which communicates with the skin at all the openings leading to or from the interior of the body.

What is the name of the secretion that moistens the surface of all mucous membranes?

Mucus.

What are serous membranes?

The membranes that line the thoracic and abdominal cavities and cover the organs contained in them.

What is the name of the serous membrane lining the abdomen and covering its contents?

The peritoneum.

(a) What is the name of that lining the chest and surrounding the lungs? (b) The heart?

(a) The pleura. (b) The endocardium lines and the pericardium covers the heart.

The Organs of Respiration

Name the different parts of the respiratory apparatus.

The nose, pharynx, larynx, trachea, lungs.

Mention an important part that the nose takes in respiration.

It warms and filters the air.

How is this possible?

(1) The nasal passage is narrow and its lining contains a large number of blood-vessels, in this way the air is warmed to a greater extent than if breathed in through the mouth. (2) The margins of the nostrils are covered with fine hairs which serve to guard against the entrance of dust and other foreign substances.

Name the openings into the pharynx.

Larynx, mouth, esophagus, two Eustachian tubes, and two posterior nares.

In addition to being one of the organs of respiration, what is the function of the larynx?

It is the principal organ of voice.

Where is the larynx situated?

Between the trachea and the base of the tongue.

What is the glottis?

A narrow opening in the constriction which occurs in the middle of the larynx.

What are the vocal cords?

Fibrous bands that form the edges of the glottis and which produce the voice.

How do they do this?

The air driven against the cords by the expiratory movement of the lungs throws the cords into vibrations which are communicated to the air above them, and thus the sound we call the voice is produced.

What is the trachea?

A cylindrical tube, about $4\frac{1}{2}$ inches long, which extends from the larynx, down the front of the neck, to the upper part of the thorax, where it divides into the two bronchi.

Give a brief description of the structure of the trachea.

It is composed of muscular and fibrous tissue with from about fifteen to twenty incomplete rings of cartilage embedded in the fibrous tissue and situated one above the other. The posterior wall, where the rings fail to meet, is formed of the muscular tissue.

Describe the bronchi and bronchial tubes.

The bronchi are two tubes, one for each lung, in structure like the trachea; they extend from the bifurcation of the trachea into the lungs, where they divide and subdivide, forming the bronchial tubes. The walls of the bronchial tubes are much thinner than the bronchi and are devoid of fibrous tissue and cartilage. They end in dilated cavities the walls of which are exceedingly fine and delicate, as are also those of the network of capillaries that surround them, thus permitting the passage of carbon dioxid from, and of oxygen into, the blood.

Give a brief description of the lungs.

They are two in number and lie one on each side of the chest. They are conical in shape and each lung

is divided into two lobes by a long fissure, and the upper lobe of the right lung is partially subdivided by a second fissure. The lung substance is composed of the bronchial tubes and their terminal dilatations, or air cells, blood-vessels, lymphatics, nerves, and elastic connective tissue.

What name is given to the parts of the lungs by which they are united to the trachea, and of what do they consist?

The roots. They consist of the bronchi, pulmonary arteries and veins, lymphatics, small blood-vessels, and nerves.

What arteries carry blood to the lungs for their nutrition? Which ones carry that for aëration?

The bronchial arteries. The pulmonary arteries.

What and where is the pleura?

A serous membrane covering the lungs, thoracic surface of the diaphragm, and the inner surface of the wall of the thorax.

Respiration

What is the object of respiration?

The exhalation of the carbon dioxid formed in the tissues as the result of oxidation and the inhalation of the oxygen required for oxidation.

What makes this interchange of gases possible?

(1) The walls of the air cells, and capillaries are very thin and of a nature to permit osmosis. (2) the natural tendency of gases is to diffuse evenly through space, therefore, there being more carbon dioxid in the capillaries than in the air-cells, and more oxygen in the latter than in the former, the carbon dioxid passes from the capillaries into the cells and the oxy-

gen from the cells into the capillaries where it unites with the hemoglobin of the red corpuscles.

What is meant by external and internal respiration?

External respiration is the interchange of gases taking place in the lungs; internal respiration, the passage of oxygen from the blood to the tissues and of carbon dioxid from the tissues to the blood.

Mention the two processes in external respiration.

Inspiration or inhalation, the passing of air into the lungs, expiration or exhalation, the forcing of air from the lungs.

Name the principal muscles concerned in the chest movements that are necessary for respiration.

The diaphragm, the intercostal muscles, the levatorum costarum and the muscles of the glottis.

In what way do these muscles control respiration?

The diaphragm contracts and is drawn downward while the respiratory muscles of the chest, by contracting draw up the ribs. Thus the size of the chest cavity is enlarged and, as the substance of the lungs expands in keeping with the chest wall, a vacuum is created in the air-cells which the air is sucked in to fill. This constitutes inspiration. In quiet breathing expiration is due to the elastic recoil of these muscles and consequent return of the thorax to its smaller size. In forced expiration, the abdominal muscles are called into play.

What is meant by the respiratory center?

The small mass of gray matter in the medulla oblongata from which nerves extend that transmit the impulses which stimulate the respiratory muscles.

By what is the respiratory center stimulated?

Chiefly, by the carbon dioxid in the blood, but, also,

by the stimulation of certain of the sensory nerves; as those which respond to pain, cold, etc.

What is meant by "tidal air"?

The amount of air exchanged in quiet respiration. This is about thirty cubic inches.

What is meant by the "vital capacity of the lungs"?

The amount of air that the lungs will hold. This, in an adult, is about 225 cubic inches.

The Vascular and Lymphatic Systems

What is the normal amount of blood in the body?

$\frac{1}{13}$ of the body weight.

From what source is blood renewed after hemorrhage?

The liquid portion and salts are renewed from the food-products and liquids taken into the body; the corpuscles are derived by cell division, from existing cells, in bone marrow. The red corpuscles are formed more especially in the marrow of the ribs from large nucleated cells called erythrocytes.

Name the constituents of the blood.

Water; red and white corpuscles and blood-platelets; various proteins, as serum globulin, serum albumin and fibrinogen; glucose; fats; salts; waste products, such as urea and creatin; oxygen; carbon dioxid; nitrogen; internal secretions, enzymes; immune bodies, as opsonins, antitoxins and anti-bacterial substances.

How many red corpuscles are there in a cubic millimeter of blood? What is their function?

4,000,000 to 5,000,000. They carry oxygen from the lungs to the tissues.

With what constituent of the red corpuscles does the greater part of the oxygen unite in the lungs?

The hemoglobin.

What constituent of the hemoglobin is essential to its oxygen combining power?

Iron.

What is the normal average amount of hemoglobin in the red cells?

About 14½ grams per 100 c.c. This is called *100 per cent.*

What are the blood-platelets? What is their function?

Exceedingly small corpuscles of unknown composition. It is thought that they assist in blood-coagulation.

How many white corpuscles are there, normally, in a c.mm. of blood? Mention some names applied to them.

About 7000. Small white cells are called *lymphocytes*, large ones, *leucocytes*. Some leucocytes are known also as *phagocytes*, because they devour bacteria. See page 120.

What are some of the important functions of the leucocytes?

They help protect the body from disease by destroying bacteria; they aid in the absorption of food, especially fat, from the intestines; they assist in the coagulation of blood.

What are opsonins?

Substances of unknown composition which seem to act upon bacteria in such a way that they are easily destroyed by phagocytes.

Mention one theory of the cause of the clotting of blood.

When blood-platelets and white corpuscles are disintegrated they liberate a substance called *thrombo-kinase* which, with the aid of the calcium salts of the blood, changes a substance called prothrombin, that is united to the fibrinogen of the blood, to thrombin and the latter changes the fibrinogen to an insoluble

substance called *fibrin* which, being insoluble, is precipitated and the precipitate gathers into its meshes a large portion of the solids of the blood.

What is the solid mass called? What the liquid portion?

The clot. The serum.

The Blood-Vessels and Heart

Name the organs which contain the blood.

The heart, arteries, capillaries, and veins.

Give a brief description of the heart.

It is a hollow, muscular organ about $5\frac{1}{2}$ inches long; it is conical in shape and lies obliquely in the chest cavity; its base being upward and to the right, its apex, downward and to the left. It is enveloped in a double sac of serous membrane, called the *pericardium*; the inner layer of the sac is closely adherent to the heart muscle, but the outer envelops it loosely, and between the two there is, in health, a small quantity of fluid. The heart is lined with a smooth serous membrane called the endocardium. It is divided into four chambers, the two upper ones are called respectively the right and left auricles, the lower, the right and left ventricles. There is, normally, no opening between the right and left sides of the heart after birth. A large artery opens out of each ventricle and two large veins empty into each auricle. The veins are not provided with valves, but the arteries and the opening between the auricles and ventricles are guarded with valves which prevent a return of blood. The valve between the right auricle and ventricle is called the *tricuspid*, that between the left auricle and ventricle the *bicuspid*, and those guarding the openings of the arteries, the *semilunar*.

Name the two arteries that open into the ventricles, and state into which ventricle each one opens, and what its office is.

The aorta and the pulmonary. The former opens out of the left ventricle and starts the aërated blood on its course through the body; the latter opens from the right ventricle and conveys blood that has been through the body to the lungs.

Name the different parts of the aorta.

The ascending, the arch, and the descending aorta. That part of the aorta contained in the thorax is also known as the *thoracic aorta*, and that in the abdominal cavity, as the *abdominal aorta*.

State how many coats there are to an artery, and the nature and office of each.

Three. The inner coat is smooth and somewhat elastic,—it serves to avoid friction between the circulating blood and vessel wall; the middle coat is composed largely of elastic tissue, and it is this elasticity that gives the artery its power of contraction and extension, which is one of the principal factors in propelling the blood through the arteries; the outer coat is composed largely of fibrous tissue, and thus contributes to the strength of the vessel.

Mention some differences between veins and arteries.

The middle coat of veins is much thinner than that of arteries, and contains but little elastic tissue; the veins are provided with valves, the arteries, with the exception of the aorta and pulmonary artery at their cardiac connection, are not; the arteries, with the exception of the pulmonary artery carry aërated blood, the veins, with the exception of the pulmonary, blood containing less oxygen and more carbon dioxid than that in the arteries.

Describe the capillaries and their function?

They are the smallest of the blood-vessels, being, as their name implies, hair-like. Their walls are composed of but one layer of epithelial cells, and are so exceedingly thin that the interchange of nutrient and waste matter is easily effected between the blood and tissues as the blood passes through them, especially as the blood, owing to the smallness of the vessels, has to pass very slowly and is under great pressure. As it passes through the capillaries of the intestines and stomach, the blood absorbs the elements resulting from the digested food; as it passes through those in the secreting glands, it gives out the elements needed for the manufacture of their secretions, *e.g.*, the digestive juices, or, as in the kidneys, the waste matter; as it passes through those in the lungs, it gives up the carbon dioxid and absorbs oxygen.

Mention factors that are of importance in maintaining the circulation.

The pumping action of the heart; the elasticity of the arteries; the resistance offered to the flow of blood by the capillaries, on account of their small diameter; muscular contractions; the respiratory movements; the valves of the veins and heart; the suction action of the heart caused by the emptying of the auricles into the ventricles.

What name is given to the blood-vessels and nerves that supply the walls of the arteries and veins?

The blood-vessels are called the *vaso-vasorum*, the nerves, the *vaso-motor*.

Name the arteries supplying the walls of the heart with blood.

The right and left coronary arteries.

Name the arteries that branch from the arch of the aorta.

The right and left coronary, the innominate, the left common carotid, and the left subclavian.

Which of the arteries supplies the head with blood?

The left common carotid, together with the right common carotid, which opens from the innominate.

Where do the common carotids divide; what are their branches called and where do they go?

They divide, on either side of the neck, into the internal and external carotids. The former pass up the side of the face and enter the skull through the temporal bones, to supply the eyes and brain; the latter pass to a point near the neck of the condyle of the inferior maxilla, where they divide into two large arteries which, with their numerous subdivisions, supply the throat, face, and skull.

How does the blood return from the head to the heart?

The blood from the parts supplied by the internal carotid returns via several small veins and sinuses to the internal jugular vein, which passes down the side of the neck to the inner end of the clavicle, where it unites with the subclavian vein to form the vein innominate. The blood supplied by the external carotid is carried by the small veins to the external jugular vein, which commences near the angle of the jaw, and passed down the side of the neck to the subclavian vein, whence the blood flows to the innominate. The innominate from the right and left sides unite and form the superior or descending vena cava, whence the blood is carried to the right auricle of the heart.

Name the arteries that branch from the thoracic aorta.

The intercostal, pericardial, bronchial, esophageal.

Mention the arteries through which the blood passes to the right hand.

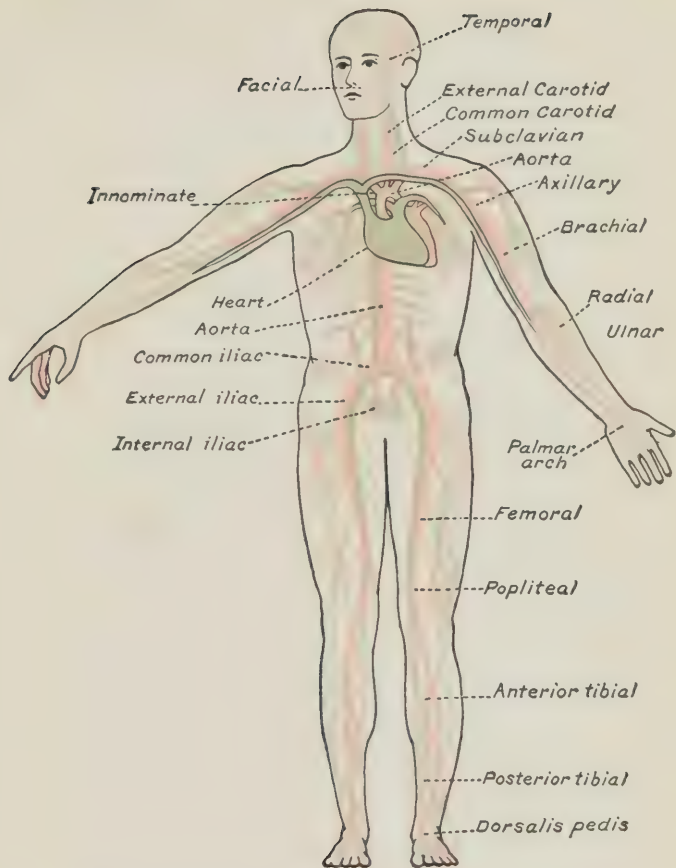


FIG. 1.—DIAGRAM SHOWING PLAN OF DISTRIBUTION OF ARTERIES AND VEINS

The innominate, right subclavian, brachial, radial, and ulnar, and the superficial and deep palmar arches.

Are the arteries supplying the left arm the same as those of the right?

With the exception of the innominate; there is no innominate on the left side, the left subclavian and left common carotid opening directly from the arch of the aorta.

Mention some of the large veins of the arm other than those called by the same names as the arteries and state why they are of special interest.

The median, extending along the front of the forearm to the elbow where it bifurcates forming the median basilic and the median cephalic veins. Intravenous infusions are usually given into one or other of these veins.

What blood does the superior vena cava carry to the heart, and what the inferior vena cava?

The superior vena cava conveys the blood from the head, face, neck, thorax, and upper extremities; the inferior, that from the abdomen, pelvis, and lower extremities.

Name the principal vessels through which the blood passes to the feet, and state their position.

The aorta; the common iliac arteries which branch from the aorta at about the center of the fourth lumbar vertebra; the external iliac into which with the internal iliac (which supplies the walls and viscera of the pelvis with blood) the common iliac divides; the femoral, as the external iliac is called when it passes over the pelvis and enters the thigh; the popliteal, so the femoral is called when it passes back of the knee; the anterior and posterior tibials, into which the popliteal divides; and the peroneal, which branches

from the posterior tibial about an inch below its bifurcation from the popliteal. The anterior tibial extends down the front of the leg and over the arch of the foot; after passing the bend of the foot it is called the dorsalis pedis artery; the posterior tibial and the peroneal pass down the back of the leg; the latter divides at the ankle into the internal and external plantar arteries, and these and the dorsal pedis unite to form the plantar arch, from which small arteries branch to all parts of the foot.

Name the two large superficial veins of the legs.

The internal and external saphenous veins.

What must be remembered when describing the circulation of the blood from the left ventricle to any part of the body and back to the ventricle?

That the blood passes through the right side of the heart and lungs before it returns to the left ventricle.

Name the arteries that branch from the abdominal aorta and state what parts of the body they supply with blood.

The celiac axis, a short artery that gives off the gastric, hepatic, and splenic arteries, which supply blood to the stomach, liver, and spleen respectively; the superior mesenteric, which supplies the small intestine below the first part of the duodenum and the upper part of the large intestine; the inferior mesenteric, which supplies the lower half of large intestine and, under the name of the hemorrhoidal plexus, the rectum; the supra-renal and renal, which supply the kidneys; the spermatic arteries in the male, or the ovarian in the female; the latter supply the ovaries and, with the uterine, which arises from the internal iliac, the uterus; the phrenic, supplying the diaphragm; the lumbar arteries, passing to the lumbar vertebræ;

sacral, to the sacrum; the right and left common iliacs, which divide into the internal and external iliacs.

What blood does the portal vein carry to the liver?

The blood collected from the capillaries of the intestine, stomach, spleen, by the splenic, gastric, and mesenteric veins. It contains absorbed food products.

The Lymphatic System

What constitutes the lymphatic system?

The lymphatic spaces, vessels, glands, and ducts.

What are the lymph vessels and where are they found?

Vessels that are very similar to capillaries and veins in structure. They are situated in all the tissues that are supplied with blood-vessels, but are especially abundant beneath the skin and mucous membranes.

(a) *Where does the lymph which the lymphatics absorb come from?* (b) *What is it?*

(a) From the blood. (b) Lymph is practically blood minus the red corpuscles.

What are the function and fate of the lymph?

When the lymph exudes from the blood-vessels, it gives to the tissues those new elements which they need for their growth and repair, and takes, in exchange, the products of their metabolism. This, when absorbed by the lymphatic vessels, is carried, *via* the right lymphatic or the thoracic duct, to the superior vena cava.

What is thus the office of the lymphatics?

To carry away from the tissues all the material they do not require and empty it into the blood so that it can be carried to the excretory organs and such of its constituents as are of no further use be excreted.

What are lymph spaces?

Minute spaces in the substance of tissue.

Give a brief description of the right lymphatic duct, state where it is situated, and from what parts of the body it receives the lymph.

It is a small vessel (about one inch in length) formed by the union of several lymphatics. It is situated at the junction of the right internal jugular and subclavian vein, and receives the lymph from the right side of the head and neck, right arm, and upper part of the trunk.

Where is the thoracic duct?

It extends from the second lumbar vertebra to the root of the neck, whence it turns downward and outward, and terminates at the junction of the left internal jugular and subclavian veins.

What are the lymph glands and in what parts of the body are the principal groups situated?

Small solid bodies, consisting of a fibrous framework, lymph sinuses, and lymph follicles, situated along the course of the lymphatics and lacteals. The more important groups are situated in the neck, axilla, back of the bifurcation of the bronchi, in the groin and abdomen.

What is the office of the lymph glands?

They act as filters and prevent bacteria and toxic substances entering the blood. They also effect certain changes in the lymph; the lymph after passing through these glands contains a greater number of leucocytes.

What are the lacteals?

Lymphatic vessels contained in the intestinal walls which absorb the chyle (*i. e.*, the milk-like fluid consisting of lymph and emulsified fat) from the intestine.

Digestive Apparatus

Of what does the digestive system consist?

Of the alimentary canal—*i.e.*, the mouth, pharynx, esophagus, stomach, and intestines; and the accessory organs—*i.e.*, the teeth, tongue, salivary glands, pancreas, liver, and gall-bladder.

What part does the tongue take in digestion?

It assists in deglutition, and it is the special organ of taste.

What is the hard palate?

The partition between the mouth and the nose.

What is the soft palate?

The soft tissue between the mouth and the pharynx.

(a) *What are the tonsils, and (b) why will even minor morbid conditions of these glands produce disproportionately severe constitutional symptoms?*

(a) They are masses of lymphoid tissue, richly supplied with blood-vessels, placed between the anterior and posterior palatine arches close to the base of the tongue. (b) Toxic matter is readily carried from the tonsils through the system, since these organs are in direct communication with the lymphatics.

Name the salivary glands and give their location.

The parotid glands, situated one on either side of the face just below, and in front of, the ear. The submaxillary glands, situated, one on either side, below the lower jaw, the sublingual, which lie directly beneath the mucous membrane of the mouth, under the tongue. These glands are all provided with ducts which open into the mouth.

Where is the stomach situated?

Just below the diaphragm, between the esophagus

and the intestines. The greater part of it is contained in the left side of the abdomen.

What are the two openings of the stomach called, and which is which?

The cardiac opening, that connected with the esophagus; the pylorus, that leading to the duodenum.

Give a brief description of the structure of the stomach, and state the peculiarity in its structure that gives it the mechanical power which serves to break and mix up the food entering it.

It is composed of four coats: known as the serous, muscular, submucous, and mucous. The serous coat is the outer membrane, the muscular coat which is next, is composed of three layers of involuntary muscle fibers running in different directions, longitudinally, circularly, and obliquely. The mucous coat is thick and soft, it is highly vascular and contains many glands, which secrete gastric juice and some which manufacture hydrochloric acid from, it is thought, chlorid salts of the blood. It is the arrangement of the muscular coat that allows of the contractions of the stomach to which the movements which constitute a most important part in digestion are due.

What is the length of an adult's small intestine?

About 22 feet.

Name the different parts of the small intestine, and their relative position.

The duodenum, the ten or twelve inches of intestine next the stomach; the jejunum, the next eight to nine feet; the ileum, the lower part of the small intestine, which opens, at the right side of the abdomen, into the large intestine.

What is the name of the valve that guards the entrance between the small and large intestine?

The *ileo-cecal* valve.

What are the names of the different parts of the large intestine, and how are they situated in relation to each other?

It begins as a dilated pouch called the *cecum*, from which opens a blind tube, termed the *vermiform appendix*. From the *cecum* the large intestine passes up the right side of the abdomen and is known as the *ascending colon*; it then crosses the front of the abdomen and is called the *transverse colon*; it descends on the left side of the abdomen and, until it reaches the lower part of the abdomen where it makes a curve resembling the figure S, it is called the *descending colon*; the S is known as the *sigmoid flexure*, and the part descending from the S, the *rectum*.

Which is most concerned in the processes of digestion and absorption, the small or large intestine, and why?

The small intestine. The large intestine does not secrete a digestive juice and digestion is carried on in it only by the ferments with which the food became mixed in the small intestine and as the result of bacterial action.

What are the names of the glands which furnish the intestinal digestive juice—the succus entericus?

The glands or crypts of *Lieberkuhn*, and *Brunner's* glands.

What glands outside of the intestine furnish digestive juices for intestinal digestion?

The pancreas and liver.

Where is the bile secreted, where stored; what condition allows of its being stored; through what channel does it reach the intestine?

It is secreted by the liver cells. During intestinal

digestion the bile passes through the common bile duct into the intestine, but at other times it passes through the cystic duct to the gall-bladder where it is stored until food enters the intestine. It does this because the orifice between the common duct and duodenum is closed until nerve-endings around the duct are stimulated by the entering food.

Give a brief description of the liver and state its position in the abdomen.

It is the largest gland in the body, measuring about ten to twelve inches from side to side, about seven inches from above downwards, and two to three horizontally, in its thickest part. It is of a dark reddish-brown color; is divided by fissures into five lobes. The substance of these lobes consists of lobules composed of masses of secretory cells surrounded and penetrated by capillaries, lymph vessels, and small ducts which arise between the cells. These ducts converge to form two large hepatic ducts, one in the right and the other in the left side of the liver and these in turn join to form the chief hepatic duct and this unites with the cystic duct, which extends from the gall-bladder, to form the *common bile duct*. The liver is situated directly below the diaphragm and in front of the right kidney, the upper part of the ascending colon, and the pyloric end of the stomach.

What large blood-vessels pass to the liver, and what is their office?

The hepatic artery, which carries the blood, required for the sustenance of the liver and the portal vein, which brings the blood from the stomach, spleen, pancreas, and intestines. This blood contains the glucose and proteins absorbed from the alimentary canal.

Mention some of the functions of the liver.

It secretes the substances from the blood which form the bile; it modifies the food-products and other matter brought to it by the portal vein; it changes glucose to glycogen, stores the greater part of the glycogen within its substance and changes it back to glucose when it is required by the blood.

What and where is the pancreas?

A long, narrow compound gland, lying in the upper part of the abdomen, behind the stomach.

What is the function of the pancreas?

It secretes the pancreatic digestive juice and, also, a secretion which is absorbed by the blood, and therefore called *an internal secretion*, which is essential for the oxidation of glucose in the tissues.

For digestion and metabolism see pages 287-290.

THE SPLEEN.—*Where is the spleen and what are thought to be its functions?*

It is below the diaphragm, behind the cardiac end of the stomach. Its functions are imperfectly understood, it is thought that it may serve as a location for the formation of leucocytes; that it may be concerned in the formation of hemoglobin or the preservation of the iron set free by disintegrated red corpuscles; that it may be in some way concerned in digestion or metabolism; that it may modify the character of abnormal material in the blood.

ABDOMINAL ORGANS.—*How is the abdomen usually divided for convenience of description? Give the names of the regions.*

Into nine regions. The three immediately below the diaphragm are called the right hypochondriac, the

epigastric, the left hypochondriac; the three central divisions are called the right lumbar, umbilical, and left lumbar; the three lowest the right inguinal, hypogastric, and left inguinal.

Name the organs or parts of organs situated in the three upper divisions.

In the right hypochondriac are the right lobe of the liver and the gall-bladder, hepatic flexure of the colon, and part of the right kidney. In the epigastric are the middle and pyloric end of the stomach, left lobe of the liver, pancreas, duodenum, parts of the kidneys, and the suprarenal capsules. In the left hypochondriac are the splenic end of the stomach, spleen, left extremity of the pancreas, splenic flexure of the colon, and part of the left kidney.

Name the viscera found in the central divisions.

In the right lumbar are the ascending colon, part of the right kidney, and some convolutions of the small intestine. In the umbilical region, the transverse colon, part of the great omentum and mesentery, transverse section of the duodenum, some of the convolutions of the jejunum and ileum, part of both kidneys. In the left lumbar are the descending colon, part of the omentum, part of left kidney, and part of the small intestine.

Name the viscera in the three lowest divisions.

In the right inguinal, the cecum and appendix; in the hypogastric, part of the small intestine,—in children and in adults when it becomes distended,—the bladder, the uterus in pregnancy; in the left inguinal, the sigmoid flexure of the colon.

The Excretory System

What is the office of the excretory system?

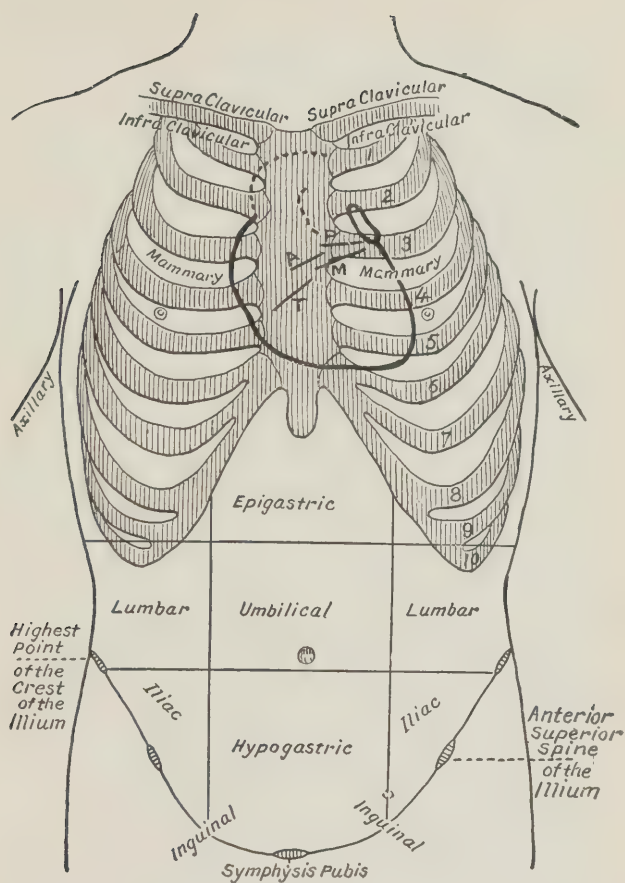


FIG. 2.—Diagram of Thoracic and Abdominal Regions.

A. Aortic valve.

P. Pulmonary valve.

M. Mitral valve.

T. Tricuspid valve.

The removal of waste products from the body.

Name the organs of the excretory system.

The lungs, skin, urinary organs, liver, and intestines.

What is the principal waste product eliminated through the lungs?

Carbon dioxid and water.

Name the chief substances excreted by the skin.

Water, salts, and a very small amount of CO₂ and urea.

How much perspiration is excreted in twenty-four hours under ordinary circumstances?

About two pints.

Name the urinary organs.

The kidneys, ureters, bladder, and urethra.

Where are the kidneys situated?

On either side the spinal column, between the first and fifth lumbar vertebra.

Give a brief description of the kidneys.

They are about four inches long and two inches wide, in shape they resemble a bean. They are encased in a tough envelop of fibrous tissue, known as the *capsule*, and surrounded by a considerable quantity of fat. They consist of an outer portion, the *cortex* or *bark*, an inner less compact portion, known as the *medulla*, or *marrow*; and, what is really a dilated portion of the ureters, the *pelvis*, or *basin*. The bulk of kidney substance is composed of Malpighian bodies, uriniferous tubules, blood-vessels, and lymphatics.

What constitutes a Malpighian body?

A plexus of blood-vessels, called a glomerulus, surrounded by what is called a *Malpighian capsule*.

What are Malpighian capsules? From what are glomeruli derived? How does the blood leave them?

The upper part of the uriniferous tubes. In form,

the capsules resemble minute hollow globes, dented in the center. The glomeruli fit into the dents. The tubes extend from the capsules to the pelvis of the kidney. The glomeruli are derived from small afferent branches of the renal artery and the blood leaves the Malpighian bodies by small efferent veins which the capillaries of the glomeruli unite to form. These veins again divide to form plexuses of capillaries which are distributed over the surfaces of the tubes and these once more unite to form veins. These veins join with those arising from the capillaries derived from the branches of the renal artery that supply the kidney with nutrition, thus forming the renal artery which holds the blood flowing from the kidney.

Where is the urine secreted and how excreted?

Secretory cells of the uriniferous tubes remove water and certain soluble solids from the blood as it circulates in the glomeruli and the plexuses of vessels on the surfaces of the tubes. This matter—urine—passes through the tubes to the pelvis of each kidney and thence through the ureters to the bladder where it remains until sufficient accumulates to distend the bladder and thus produce the irritation which causes contraction of its walls and consequent relaxation of the sphincter muscle at its orifice. From the bladder, the urine passes through the urethra.

Urine

What are the principal constituents of normal urine?

Water, salts, the nitrogenous waste resulting from katabolism, also, the kidneys endeavor to rid the body of all foreign substances; therefore, drugs taken into the body and poisons formed within the body—as indican—will be in the urine.

What is the specific gravity of normal urine?

1012 to 1030, 1020 being the average.

What is meant by the specific gravity, and what does it indicate?

The weight of urine as compared with water at 60° F., the water weighing 1000. The specific gravity indicates the relative proportion of solid matter in the urine.

What is the ordinary capacity of the bladder?

About one pint.

What is the average quantity of urine voided in twenty-four hours?

Forty to fifty ounces by an adult; twenty-five to thirty-five, by children from five to nine years; fifteen to twenty-five by children two to five years.

Mention some causes likely to increase the quantity of urine.

The consumption of a large quantity of liquids, nervousness, hysteria, diabetes mellitus, diabetes insipidus, convalescence from acute diseases, diuretics.

Mention some causes likely to diminish the quantity of urine.

Consumption of a small amount of water, free perspiration, high fever, diarrhea, vomiting, most cases of nephritis, and the approach of death in all diseases.

What is the difference between retention and suppression?

In retention, the urine is secreted by the kidneys, but for some reason, such as obstruction in the urethra or neck of the bladder, paralysis of the bladder, nervous contraction of the urethra, or dulling of the senses so that there is no desire to pass urine, it is

not expelled from the bladder. In suppression the kidneys fail to secrete the urine.

What is meant by retention with overflow?

A constant passing of small amounts of urine as the result of an over-distended bladder.

Give reasons why the condition must be noticed.

It is likely to cause cystitis; some of the urine constituents may be absorbed; after an abdominal operation, a distended bladder may cause complications.

Mention some cases likely to change the color of the urine.

(1) Diminished secretion will usually result in a highly colored urine; (2) excessive secretion, with the exception of diabetes mellitus, causes the urine to be of an abnormally light color; (3) certain drugs; (4) by the presence of decomposed blood pigment; (5) the presence of bile pigment; (6) the presence of chyle; (7) the presence in excess of many of its normal constituents; (8) the presence of bacteria; (9) of pus; (10) alkaline decomposition.

(a) *What is the normal reaction of urine?* (b) *How is urine tested to determine its reaction?*

(a) Acid. (b) With litmus paper. If the urine is acid it will turn blue litmus paper red, if alkaline, it will turn red paper blue.

Mention some non-pathogenic causes for alkaline urine.

Urine will often be temporarily alkaline after a heavy meal; also, especially in warm weather, it will turn alkaline after it has stood some time.

How can this alkalinity be distinguished from alkalinity due to the presence of potash or soda?

When alkalinity is due to food, on standing, the litmus paper will shortly resume its natural hue.

What is urea?

A simple nitrogenous substance formed in the body, largely in the liver, by the katabolism of protein substances.

What disease was thought to be due to retention of urea in the body? What is the present theory?

Uremia. It has been demonstrated that though uremia follows failure of the kidneys to excrete urine, urea, by itself, is not poisonous.

Mention some conditions that will increase the amount of urea in the urine?

A large supply of proteid food, strenuous exercise, hot baths, fever in its early stages, and some diseases.

(a) *What are urates?* (b) *When and how are they seen?*

(a) Salts of uric acid—*i. e.*, uric acid in combination with an alkali, *e.g.*, potassium. (b) Urates are sometimes seen as a reddish deposit in urine after it has stood.

Will such deposit necessarily mean an excess of urates in the urine?

No, it may be due to a high degree of concentration or to a marked acidity of the urine.

What are the epithelial cells often seen in urine?

They are the product of the normal waste of the mucous membrane of the urinary tract.

Mention some causes of albuminuria other than renal disease.

Pressure on the abdominal walls from tumors or a pregnant uterus, some febrile diseases.

Mention some conditions that will cause albuminuria.

Inflammatory or degenerative changes in the kidneys, abnormal changes in the quality of the blood entering the kidneys, alteration in the blood pressure in the kidneys.

Describe a common test for albumin, urates, and phosphates.

Filter the urine; if it is not acid, render it so by the addition of two or three drops of acetic acid 10%. Boil it for one minute, holding the test-tube so that the upper part of the urine will boil first. Any opacity appearing will be due either to albumin or to earthy phosphates. If it is due to the latter, it will disappear on the addition of two or three drops of acetic acid; but, if to the former, the presence of the acid will cause the albumin to be further precipitated. To test for urates, add a few drops of acetic or nitric acid to the urine, a precipitate will be due to urates or albumin; to discover which, boil the urine: if urates, the precipitate will disappear; if albumin, it will be increased.

When is glucose found in normal urine?

After eating a large quantity of saccharine food, occasionally, during convalescence from febrile diseases, and during pregnancy.

When glucose persists in the urine what conditions is indicated?

Diabetes mellitus.

Describe Fehling's test for glucose?

Pour a small quantity of Fehling's solution in a test-tube and add to this, drop by drop, an equal amount of the urine; boil. If sugar is present a reddish precipitate will appear. Unless the solution is known to be perfectly fresh, it should be tested before using. To test pour some into a test-tube and dilute it with five times its bulk of water and boil. If a precipitate appears, the solution is worthless.

What would you do if you noticed any cloudiness, abnormal color, or odor in a patient's urine?

Save a specimen for the doctor's inspection.

What urine is best saved for analysis, why?

That passed before breakfast. Food causes many temporary changes in urine.

Why is the urine of all patients entering the hospital examined?

The condition of the urine often aids in diagnosis; diseases of the kidneys often complicate other maladies, and recovery from the renal disturbance often depends on its early recognition and treatment.

Why is urine examined before and after operation?

It is examined before operation because, under many conditions of the kidneys, it is unadvisable to give an anesthetic. The post-operative specimen is required in order to ascertain if the anesthetic has had any undesirable effect on the kidneys.

How will you collect a twenty-four hour specimen?

Note the hour when the patient voids urine, throw that urine away, but save all he passes subsequently until the same hour next day. The bed-pan and bottle in which the urine is saved should be sterilized; the bottle tightly stoppered with sterile cotton, and kept in a cool place. Sometimes, a few drops of thymol, chloroform, or other antiseptic that will not cause changes in the urine are put in the bottle.

What extra precaution, to keep the urine sterile, will you take when obtaining a sterile specimen from a woman?

Catheterize the patient.

How could you obtain a specimen from a male infant?

From a girl baby?

Put the penis in a small sterile bottle and secure the latter in place with a bandage or diaper. Place a girl

baby on two pillows, leaving the latter slightly apart under the buttocks, and placing a bed-pan in the opening with its edges under the pillows, the edges of the pillows being covered with a rubber or doubled diaper.

The Nervous System

What constitutes the nervous system?

(1) The brain and spinal cord (*i.e.*, the large masses of nervous tissue situated within the skull and the spinal column). (2) The sympathetic ganglia (*i.e.*, smaller masses of nerve tissue situated for the most part in the abdominal and thoracic cavities, chiefly along either side of the vertebral column, but also in the neck and head). (3) Nerve trunks which connect the brain, cord, and sympathetic ganglia with each other and with the periphery and viscera. (4) Modifications of the peripheral terminations of the nerves which constitute the organs of the external senses; as the eyes, ears, etc.

Name the different parts of a nerve cell or neuron.

The cell body and the cell processes—*i.e.*, dendrites, axis-cylinder processes—known also as neuraxons and axons—collaterals, nerve fibers, nerve endings.

Give a brief description of each of the processes and describe its function.

The dendrites are delicate processes that, almost immediately upon emerging from the cell body, break into a series of fine branched filaments that divide and subdivide like the branches of a tree. The dendrites of different cell bodies come almost, but not quite, in contact with each other and their function is to collect nerve impulses from other cells and carry

them to their own cell body. Axis-cylinder processes are usually of some length. They diminish in diameter, slowly, in their course, give off side branches at intervals, and terminate either in an arborization like that of the dendrites or else merge into what is known as nerve fibers. Their function is to carry impulses to and from nerve centers. Collaterals are the side branches of the axis-cylinders. Nerve fibers are terminations of the axons. They are of two kinds, white or medullated fibers, gray or non-medullated. In the white variety, the axis-cylinder is covered with a sheath, known as the *neurilemma*, but in the white fibers there is a white semi-solid substance, known as the *medullary or myelin sheath* or *white substance of Schwann*, between the sheath and the cylinder, to which the white color of the fibers is due. Nerve endings are the peripheral terminations of the nerve fibers. It is their function to receive impressions, or, in other words, to be stimulated and to diffuse nerve impulses transmitted by motor nerves into the muscles, glands, etc.

How are nerve fibers classified as regards their function of carrying impressions received from nerve endings to the brain, etc., or of transmitting impulses from the nerve centers to the muscles, glands, etc.?

Those which carry impulses to the nerve centers are called sensory, afferent, or centripetal fibers; those carrying impulses from the centers to the periphery are known as motor, efferent, or centrifugal fibers.

Of what does a nerve consist?

Of bundles of nerve fibers.

What is a mixed nerve?

One which has both sensory and motor fibers.

What is meant by nerve centers?

The various masses of gray nerve tissue from which the nerves which control the various functions of the body arise.

Of what are nerve centers composed?

Of nerve cell bodies, dendrites, the beginning of the axis-cylinder processes and their collaterals.

State some functions of the nerve cell bodies.

(1) They afford nutriment for their processes; if cell bodies are destroyed, the nerves comprised of fibers arising from them will die. (2) They transmit impulses. (3) They modify impulses.

Name the membranes covering the brain, and cord.

Dura mater, pia mater, and arachnoid.

Name the principal divisions of the brain?

The cerebrum, cerebellum, pons Varolii, and medulla oblongata.

Of what does the cortex or outer part of the cerebrum consist?

Of gray matter.

What constitutes the white matter of the cerebrum?

The nerves passing to and from the cell bodies of the gray matter.

Of what does the spinal cord consist?

Of a central column of gray matter surrounded by columns of white matter which consist of the nerves passing to and from the brain, of nerves connecting different layers of the gray matter of the cord and of nerves emerging from and entering the cord.

As regards the functioning of the cortex of the cerebrum, what names are given to different portions of it? Why?

The anterior portion is called the *association area*; for it is here that memories of experiences are laid down by, it is thought, some unknown material change in the network of nerve cells; also, the special centers

which give rise to the various higher faculties as oratory, music, reasoning, etc., are in this part of the cortex. The posterior portion of the cortex contains the sensory areas; *i. e.*, the centers controlling the senses, *e. g.*, sight, hearing, taste, etc. The region between the association and sensory areas is known as the *motor area*, for the centers which control those contractions of the skeletal muscles that give rise to movements are in this region.

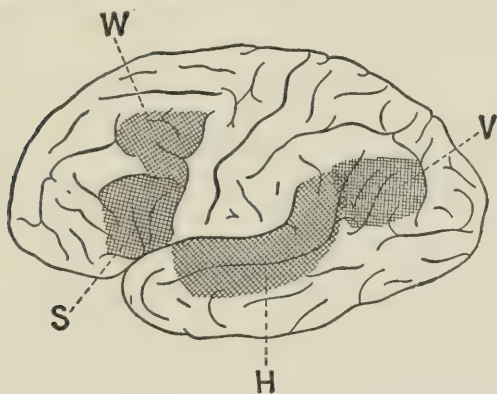


FIG. 3.—Lateral view of a human hemisphere; cortical area *V*, damage to which produces “mind-blindness” (word-blindness); cortical area *H*, damage to which produces “mind-deafness” (word-deafness); cortical area *S*, damage to which causes the loss of audible speech; cortical area *W*, damage to which abolishes the power of writing. (Howell.)

What is the function of the cerebellum?

It controls the coördination of ordinary movements and the maintenance of equilibrium.

What is the purpose of the pons?

It serves as a bond of union between the different parts of the brain and it contains small masses of gray

matter the fibers from which are connected with certain of the cranial nerves.

What are the functions of the medulla oblongata?

The medulla controls a large number of the vital reflex and automatic actions of the body; *e.g.*, respiration, the heart beat, swallowing, etc.

What are the functions of the spinal cord?

The transmission of impulses; it is the conduction path to and from the brain; it contains the centers for many reflex actions.

What is meant by reflex actions?

Those performed without thought; *i.e.*, involuntary actions.

What is meant by automatic actions?

Those due to stimuli arising within the organ or the nerve center; *e.g.*, the rhythmical action of the heart and the respiratory movements.

To what are acquired habits due?

The frequent performance of actions in consequence of which a lasting impression is made upon nerve centers, and connections between these centers and certain nerves are formed which causes the individual to react to a stimulus in a certain manner.

How many sets of nerves are there? What are they called? Designate each set.

Four. Twelve pairs of cranial nerves, those passing from the brain through openings in or between bones of the skull; the cerebrospinal nerves, those extending between the brain and the cord, forming the white matter of the cord, the 31 pairs of spinal nerves, these serve to connect the spinal cord with the periphery; the nerves of the sympathetic system, these pass from the sympathetic ganglia to the spinal cord and to the viscera.

Why will injury to motor centers on the right side of the brain result in paralysis of parts on the left side of the body?

Because the nerves coming from the brain decussate—cross—in the medulla oblongata.

What are the nerves called which control the caliber of the blood-vessels?

Vaso-motor nerves and, according to their action, *vaso-motor nerves* are called *vaso-constrictors* and *vasodilators*.

Mention two important functions that are controlled largely by the action of the vaso-motor nerves. Give examples.

Heat regulation and secretion by the digestion and other secretory glands. Cold stimulates the cold spots of the skin and the result of this stimulus, when transmitted to the vaso-constrictor centers, is the contraction of the skin blood-vessels and consequent driving of the blood to the interior of the body and prevention of loss of heat from the blood by radiation. When glands are stimulated, as those of the digestive apparatus are by the taking of food, their blood-vessels are dilated by the action of the stimulus on the vasodilator centers and the glands are thus provided with the blood which they need for the preparation of their secretion.

Organs of Special Sense

What is a sense organ?

An organ which receives a stimulus and transforms it into a sensation.

What are the essential parts of a sense organ?

A peripheral organ for the reception of the stimulus; a nerve for conducting the stimulus; a nerve center in the brain for the perception and interpretation of the stimulus.

How are sensations classified? Give examples of each kind.

As common or internal sensations (e. g., pain, fatigue, hunger, thirst) and external or special sensations (e. g., sight, hearing, smell, taste, pressure or tactile sense, temperature sense).

Why does loss of taste frequently complicate a cold in the head?

What is usually called the taste of substances is often largely odor due to volatile substances that are liberated from food during mastication and ascend through the pharynx.

Where are the nerve endings connected with the temperature sense found and what are they called?

In the true skin, Hot and cold spots, according to the sensation produced by their stimulation.

In what parts of the body are the greatest number of nerve endings concerned with sense of touch (tactile sense) found?

In the tip of the tongue and the front of the tips of the fingers.

THE EYE.—*What are the orbits?*

The bony cavities which contain the eyeballs.

Why do the eyes often look sunken after illness?

The cushions of fat on which they rest in the orbits are absorbed when a large quantity of fat is being oxidized in the body as is often the case in illness, when sufficient food is not taken.

What is the conjunctiva?

The delicate membrane which lines the inner surface of the eyelids and is reflected over the front of the eyeball.

Name the different parts constituting the wall of an eye?

The sclera and cornea, the choroid, ciliary zone and iris, the retina.

Give the location, function, and a brief description of the sclera.

The sclera, often called the *white of the eye*, is a strong, opaque, fibrous membrane which forms the posterior $\frac{5}{6}$ of the outer coat of the eyeball. It is the strongest coat and the one upon which the maintenance of the shape of the eyeball depends. The sclera varies in thickness from $\frac{1}{2}$ millimeter to $\frac{1}{6}$ of a millimeter. It is thinner in children than in adults, which is why the whites of children's eyes is so much clearer and bluer than that of adults; the blue color being due to the showing through of the darker coat underneath.

Locate and describe the cornea.

The cornea is continuous with the sclera and covers the anterior $\frac{1}{6}$ of the eyeball. It consists of layers of exceedingly thin, transparent connective tissue held to each other by fine fibers.

Mention the location, function, and nature of the choroid.

The choroid coat is attached to the under surface of the sclera. It consists almost entirely of an interlacement of small blood-vessels, held together with a delicate connective tissue in which are many pigment cells. The numerous blood-vessels and pigment cells of the choroid make the membrane so dark and opaque that it serves to darken the chamber of the eye, which, like the dark chamber of the photographer's camera, prevents the reflection of light.

Mention the location and nature, of the ciliary zone.

It is continuous with the choroid. It contains

considerable muscular tissue and, on its under surface, a series of fine ridges called *ciliary processes*.

Mention the location, nature, and function of the iris and pupil.

The iris is continuous with the ciliary zone. It is the colored membrane that hangs like a curtain behind the transparent cornea. It consists of exceedingly delicate connective and muscular tissue with numerous small blood-vessels, nerve fibers, and a varying amount of pigment cells. The color of the iris depends upon the amount of pigment cells. When they are abundant, the iris will be black, brown or gray, when they are scanty, the blue shade of the retinal cells will show through the iris and it will be blue.

Mention the location, nature, and function of the retina.

The retina results from the spreading out of the optic nerve. It lines the eyeball as far as the pupil.

What are (1) the vitreous humor (2) the aqueous humor (3) the crystalline lens?

(1) The jelly-like substance that fills the posterior cavity of the eye. (2) The watery fluid that fills the front cavity of the eye. (3) The transparent, biconvex, fibrous substance which divides the anterior and posterior cavities. It is enclosed in a thin membrane called the *capsule* which surrounds it and is held in place by a ligament which is fused to the anterior surface of the capsule and, on either side, to the ciliary processes.

What constitutes the refractory apparatus of the eye?

The cornea, crystalline lens, the humors, ciliary muscle and suspensory ligament.

Why are these parts of the eye termed the refractory apparatus?

Because, when parallel rays of light enter the pupil and pass through the cornea, humors, and lens they are bent and converge as they do when passing through a convex glass lens and they are thus brought to a focus on the retina. When, for any reason, rays of light are not focused on the retina, the picture of objects is blurred and indistinct. The ciliary muscle and the ligament are of use, because, when an attempt is made to view anything near at hand the ciliary muscle contracts and, in doing so, draws the choroid forward and as this relaxes the tension on the ligament, the anterior surface of the lens becomes more convex and the degree of converging of the rays is thus increased and rays brought to a focus more quickly.

Why do we see objects?

Because they reflect rays of light, which, entering the eye, stimulate certain parts of the retina in consequence of which impulses pass to that part of the brain concerned with the sense of sight.

Of what does the lachrymal apparatus consist?

The lachrymal gland and conjunctiva which secrete the tears and the puncta lachrymal, the lachrymal duct, the lachrymal sac, and the nasal duct through which the tears, after flowing across the eyes, pass into the nose.

Where is the lachrymal gland situated?

Just within the orbit, at the upper, outer angle of the eye.

What is the function of the gland?

The secretion of a fluid that lubricates the eye thus preventing irritation. When more of this fluid is secreted than can be carried off through the nasal duct it overflows the lower lid in the form of tears.

Mention the different sets of eye muscles.

The extrinsic muscles, *i. e.*, those attached to the orbit and to the eyeball, contraction of which causes movements of the eyeball; the ciliary muscles which are concerned with refraction; the muscles of the iris, which regulate the size of the pupil.

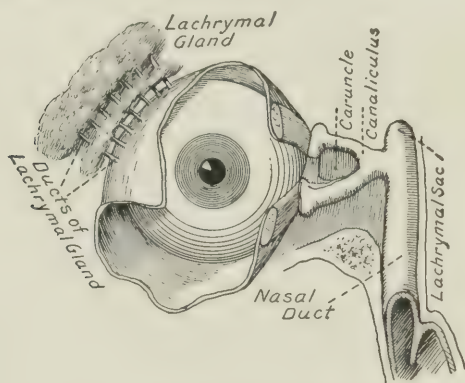


FIG. 4.—The lachrymal apparatus of the right eye.

What is meant by hypermetropia—farsight—myopia—nearsight—astigmatism?

In hypermetropia, the cornea and lens, for varying reasons, cannot become as convex as in the normal eye, consequently, parallel rays of light could only come to a focus if they extended behind the retina. In myopia, the curvature of the eyeball is excessive and rays of light come to a focus before they reach the retina. In astigmatism, the curvature of the cornea and lens is not equal.

THE EAR.—*Name the different sections of the ear.*

(1) The external ear, which consists of the pinna or auricle and the auditory canal; (2) the middle ear, or

tympanum cavity; (3) the internal ear, which is composed of the cochlea and the semicircular canals.

What is the purpose of the external ear?

It collects the sound waves and carries them to the tympanum.

State the name and purpose of the glands situated near the orifice of the auditory canal.

The *ceruminous glands*. They secrete a wax-like substance, called *cerumen*, which protects the ear from the entrance of foreign substances, such as dust and insects.

Name the membrane between the external and middle ear.

The *membrana tympani* or *drum*.

What is the purpose of the membrana tympani?

The impact of sound waves against it causes it to vibrate. This vibration sets the entire contents of the ear in action, and the auditory nerve is thus irritated, and carries the sensations received to the brain center of hearing.

Name the three small bones in the tympanum cavity, their position, and their purpose.

The malleus, or hammer; the incus, or anvil; and the stapes, or stirrup. The first is attached to the drum membrane, the last to the window, or foramen ovale, at the entrance of the inner ear; the anvil is between the other two bones and serves to unite them. The hammer transmits the vibrations of the drum to the anvil, the anvil to the stirrup; the stirrup is thus driven slightly forward, and sets the membrane that is stretched over the foramen ovale in motion.

Name the opening in the upper part of the back wall of the middle ear.

The mastoid antrum.

What opening is there in the anterior end of the floor of the middle ear?

The ear orifice of the Eustachian tube.

Into what cavity does the other end of the Eustachian tube enter?

The naso-pharynx.

What is the purpose of the Eustachian tube?

It ventilates the middle ear, and serves to keep the atmospheric pressure equal on either side of the drum.

What is apt to be the consequence of a stoppage in an Eustachian tube?

The air in the middle ear becomes heated and thereby expanded, and either the drum is pushed outward or else the rarefied air escapes, leaving a partial vacuum in the middle ear. Either of these conditions may, unless relieved by the removal of the stoppage, result in pathological changes which will produce, at least, partial deafness.

Give a brief description of the internal ear.

It consists of a connected series of cavities, known as the semicircular canals, the vestibule, and the

cochlea, which are hollowed out of the petrous portion of the temporal bone. The cavities are lined with a membranous bag and the portion in the vestibule is so shaped that it forms two sacs open at either end.

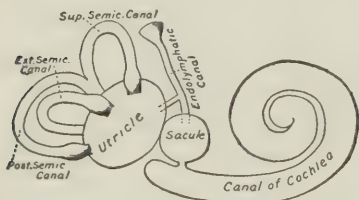


FIG. 5.—Membranous labyrinth of the right ear, viewed from the outer side. Semidiagrammatic.

One sac, known as the *utricle*, communicates with the

semicircular canals, the other, the *sacculle*, opens into the cochlea. This membrane, especially in the canals and the cochlea, contains highly specialized cells to which the fibers, into which the auditory nerve divides, when it enters the inner ear from the brain, are distributed. Between the membranous bag and the bone is a fluid called the *perilymph* and within the bag a fluid known as *endolymph*.

What part does the cochlea take in hearing?

The vibrations of the small bones of the middle ear set the membrane of the oval window (which is between the vestibule and the middle ear) in motion, this causes waves in the perilymph which stimulate nerve endings in the cochlea and these transmit the impulses over the auditory nerve to the center of hearing in the brain.

What is the function of the semicircular canals?

They are concerned with maintaining balance. It is thought that movements of the head cause changes in the position of the pressure of the endolymph within the canals which, by its action on those fibers of the auditory nerve that connect with the cerebellum, give rise to the consciousness of the position of the body necessary to maintain balance.

Female Generative Organs

Name the internal female generative organs.

Vagina, uterus, Fallopian tubes, ovaries.

Name the viscera surrounding the uterus, and their relative position.

The bladder lies in front; the rectum, behind; the small intestine, above.

What is the length of the uterus?

About three inches.

Name the different parts of the uterus.

The fundus, body, and neck.

(1) *What is the os internum, (2) the os externum?*

(1) The opening between the body and the cervix of the uterus. (2) The opening of the cervix into the vagina.

How is the uterus maintained in its position in the pelvic cavity?

By means of ligaments—especially the broad and round ligaments.

What and where are the broad ligaments?

Folds of peritoneum. They cover the back and front of the uterus, and reflect, in front, over the back wall of the bladder and, in the back, over the anterior wall of the rectum.

What are the round ligaments?

Round fibro-muscular cords, situated between the folds of the broad ligament, and extending from the upper angle of the uterus to be inserted in the vulva.

Give a brief description of the Fallopian tubes and their purpose?

The Fallopian tubes, two in number, pass, one on either side, from the upper angle of the uterus. They extend, in a somewhat tortuous course, between the folds of the broad ligament toward the sides of the pelvis, and terminate in a dilated funnel-shaped extremity the free margin of which is, as it were, frayed into a number of fringe-like processes—the fimbriæ. They are about four inches in length and $\frac{1}{2}$ of an inch in diameter at their junction with the uterus, but they gradually increase in size in their course, so that at their distal end they are about the size of a goose-

quill. Their function is to convey the ova from the ovaries into the cavity of the uterus.

How are the tubes connected with the ovaries?

By means of the largest of the fimbriæ.

Where are the ovaries?

They are situated, one on either side of the uterus, below the Fallopian tubes, between the anterior and posterior folds of the broad ligament.

How are they connected with the uterus?

By means of the Fallopian tubes and a short ligament—the ligament of the ovary.

What is their function?

To produce, develop, and discharge the ova.

Mention the different parts of the ovaries.

(1) The framework of connective and muscular tissue, usually called the stroma or bed. (2) The vesicles, or follicles, which are dotted about in the stroma, called the *Graafian follicles*.

What is the function of the Graafian follicles?

It is in them that the ova are developed.

What and where is the vagina?

It is a membranous sac which encircles the lower portion of the cervix of the uterus and extends downward and forward to the vulva, behind the bladder and in front of the rectum.

What constitutes the vulva?

The external parts of the genital canal.

What is the perineum?

The bands of muscle, covered with skin, that constitute the floor of the genital canal.

State the purpose, and give a brief description of the mammary glands.

They secrete the milk. Each breast consists of some 15 or 20 secretory glands, separated from each other

by fibrous and fatty tissue. Each of these glands has an excretory duct with an opening in the nipple and is formed by the union of a number of smaller glands.

For the nature of glands see Appendix, page 374.
For the physiology of reproduction see Obstetrics.

CHAPTER XVI

FOOD

Nature and Uses of Food. Digestion. Fuel Value of Foods. Methods of Cooking and Preserving. Feeding of Infants and Children. Food in Disease.

What are the uses of food?

Food supplies material for the formation and growth of all the tissues and organs of the body and repairs their waste, it also acts as a fuel, since, after it is digested, it is absorbed and carried to the tissues where oxygen combines with and decomposes it, giving rise to heat and energy.

Name the principal elements of which food is composed.

Carbon, hydrogen, nitrogen, oxygen, sulphur, iron, calcium, chlorine, magnesium, phosphorus, potassium, silica, sodium.

Name two common classifications of food.

Organic, inorganic; nitrogenous, non-nitrogenous.

Which are the organic food-stuffs?

The protein substances, fats, and carbohydrates.

Which are the inorganic?

Minerals and water.

Which are the nitrogenous? Which the non-nitrogenous?

All protein substances. The fats and carbohydrates.

Why are the nitrogenous foods so called? What function do they serve that other food-stuffs do not?

They contain nitrogen. They are used for building and repairing muscular tissue.

How are protein substances classified?

- | | | |
|---------------------|--|--|
| As | 1. Simple proteins (<i>i. e.</i> protein substances which yield only amino acids or their derivatives on hydrolysis). | { Albumins
Globulins
Glutelins
Alcohol-soluble proteins
Albuminoids
Histones
Protamins |
| | 2. Conjugated proteins (<i>i. e.</i> substances in which the protein molecule is combined with a molecule or molecules of other matter). | { Glycoproteins
Nucleoproteins
Hemoglobins
Phosphoproteins
Lecithoproteins |
| 3. Derived proteins | { Primary derived proteins (<i>i.e.</i> substances derived from other proteins, by hydrolytic changes, in which there is only slight alteration in the protein molecule).

Secondary derived proteins (substances resulting from the further cleavage of the protein molecule). | { Proteans
Metaproteans
Coagulated proteins

Proteoses
Peptones
Peptids |

- (a) *State where albumins and globulins are found.*
 (b) *Give examples of each.* (c) *Compare them.*

They are found in nearly all animal and many vegetable tissues, in milk, eggs, blood. Examples of albumin: Lactalbumin of milk; ovalbumin of eggs; serum-albumin of blood; myogen of muscle. Examples of globulin: Serum-globulin and fibrinogen of blood; myosin of muscle. (c) The albumins and globulins are very similar and their classification depends upon differences in their solubility; *e.g.*, albumins are soluble and globulins insoluble in distilled water.

They are both soluble in dilute solutions of acids, alkalies, and neutral salts and are converted to metaprotean by boiling in either dilute acid or alkaline solutions. They are both coagulated by heat.

Give examples of the other simple proteins.

Glutelins, the gluten in the seeds of cereals. Alcohol-soluble protein, the gliadin of wheat and rye. Albuminoids, gelatin. Protamins and histones, very simple forms of protein that occur in some spermatozoa and in hemoglobin.

What are nucleoproteins?

Compounds of protein and nucleic acid. They form an important constituent of cell-nuclei. When oxidized in the body, they are decomposed to uric acid.

What is meant by hydrolysis? Give an example of hydrolytic changes.

The chemic decomposition of complex compounds with absorption of water. The changes occurring in food during digestion are of this nature.

Name the non-nitrogenous food-stuffs.

Carbohydrates and fats.

What is their function in the body?

To form fatty tissue and supply heat and energy.

What constitute the carbohydrates?

Sugars, starch, cellulose, gums.

How are the carbohydrates classified?

(1) Sucroses, *i.e.*, disaccharids ($C_{12}H_{22}O_{11}$), *e.g.*, cane sugar, beet sugar, maple sugar, maltose (malt sugar), and lactose (milk sugar). (2) Glucoses, *i. e.*, Monosaccharids ($C_6H_{12}O_6$), *e.g.*, dextrose, levulose, and invert sugar. (3) Amyloses, *i.e.*, polysaccharides ($C_6H_{10}O_5$) *e.g.*, starch, dextrine, cellulose, glycogen, and gums.

Where are dextrose and levulose found?

In fruit.

What is invert sugar? Give an example.

A mixture of levulose and dextrose. Honey is the most familiar form.

How is glucose sometimes obtained?

By boiling starch with acid.

What word expresses the nature of this change?

Hydrolysis.

What is the effect of heat and acids on sugar?

They change it to glucose.

To what are sugars and starch changed in the body as the result of digestion?

Glucose.

What is the comparative sweetness of glucose and sugar?

Glucose is not half as sweet as sugar.

How does the knowledge that heat will change sugar to glucose and that glucose is not as sweet as sugar influence our use of sugar in cooking?

When possible to avoid it, sugar is not added to food until cooking is about completed; and if necessary to add it earlier, more sugar is used, the additional quantity necessary depending on the length of time it is to be exposed to the heat.

When is sugar a particularly valuable article of diet? Why?

During hard labor or unusual exercise. Because it is easily and quickly digested, absorbed, and oxidized, and thus is valuable as a preventive of fatigue.

Why is it harmful to eat too much sugar?

The blood becomes surcharged with glucose and the products of its imperfect oxidation. (See Metabolism, page 288.)

Mention common tests for detecting the presence of starch, dextrin, and glucose in substances.

(1) Adding iodine to the matter to be tested. Starch gives a blue color; dextrin a purple or red color or no color according to the degree to which the starch has been dextrinized; glucose gives no color. (2) Glucose and some dextrins change the blue cupric hydroxid of Fehling's solution to red cuprous oxid.

What is dextrin? Give an example.

(a) An intermediate product in the hydrolysis of starch; either as the result of digestion or of exposure to heat. (b) Crust of bread.

What is cellulose?

The hard woody fibre of plants, such as the harder fibres and peel of potatoes, the outer coat of cereals.

What forms of cellulose are used as food? What is their value?

The cellulose of young plants and that which can be softened by cooking. They stimulate the peristaltic action of the intestine.

What is glycogen?

A form of starch into which, influenced by certain enzymes of the liver, glucose is changed when it is carried to that organ after absorption.

What are gums?

Glutinous substances contained in the juice of the majority of plants.

What elements enter into the composition of fats?

Carbon, hydrogen, and oxygen.

Name the two constituents of fat.

Fatty acids and glycerin.

Name the principal fatty acids.

Stearic, oleic, palmitic, butyric.

Name the simple or fundamental fats.

Stearin, palmitin, olein.

Which of these simple fats enter into the composition of animal fat, and which into that of vegetables?

Animal fat is composed of all three of the simple fats; vegetable fat consists of palmitin and olein.

In what respect does olein differ from the other two fats?

It is liquid at ordinary temperature, while the other two are solid.

(a) Which is the most solid of the three fundamental fats? (b) In what fat is it found in larger proportion? (c) Which fat is present in the largest proportion in butter? (d) Which in lard?

(a) Stearin. (b) In mutton fat. (c) Palmitin. (d) Olein.

(a) What are the volatile oils? (b) For what are they used?

(a) Oils, of a volatile nature, which are obtained by pressure from the vanilla bean, orange, and lemon rind, and certain nuts. (b) They are used for flavoring.

What is lecethin? Where is it found?

A fat-like substance containing phosphorus and nitrogen. It occurs in nearly all cells, but chiefly in those of the nervous system and in yolk of egg.

(a) In what conditions is fat a particularly valuable article of diet? (b) Why?

(a) In wasting diseases, such as tuberculosis, they are particularly valuable; because they form fatty tissue and, being easily oxidized, they save the tissues from consumption. (b) They are valuable in diseases, such as diabetes, where carbohydrates are prohibited; because they can replace the latter in producing bodily heat and energy.

(a) *When must fats be withheld or only given in limited porportion?* (b) *Why?*

(a) When a person is troubled with indigestion and when a person is jaundiced. (b) In the former case, because fats are not easily digested, in the latter, because the jaundiced condition shows that bile is being absorbed into the blood and therefore there will not be sufficient in the intestine to digest the fat.

What per cent. of the body weight do salts constitute?

About 6%.

What are the chief uses of salts in the body?

They enter into the composition of the various tissues of the body and are necessary for their normal conditions; they harden the bones; they maintain normal osmotic pressure in the tissues and fluids of the body and consequently play an important part in controlling the flow of water to and from the tissues; they maintain certain of the solid substances of the blood in solution; they are necessary for the clotting of blood (calcium salts) for the making of hemoglobin and the union of oxygen with the hemoglobin (iron). The calcium, potassium, and sodium salts maintain the rhythmical contractions of the heart muscle and the irritability of muscular and nervous tissue which is essential for their functioning. The chlorids are required for the making of the hydrochloric acid, necessary for gastric digestion.

Mention some diseases that are often, at least partly, due to a deficiency of salts, or mineral matter, and the particular salt that is lacking.

Anemia, in which there is a lack of iron; rickets, due more especially to a lack of lime salts; scurvy, in which there is a deficiency of salts of potash.

Name some foods that contain a comparatively large amount of iron.

Beans, peas, eggs, oatmeal, cornmeal, barley, wheat flour—unless too much refined—spinach, lettuce, raisins, prunes, meat—especially rare beef, but the iron in meat is in combination with hemoglobin which is very imperfectly digested and absorbed.

Can the inorganic iron used as medicine take the place of food iron?

No, experiments have shown that inorganic iron is worse than useless without food iron and it is thought that inorganic forms only, in some unknown way, aid in the utilization of food iron.

Why are children who are fed on proprietary farinaceous foods apt to be rachitic?

Such foods are deficient in salts and proteids.

Mention some foods rich in calcium (lime).

Milk, asparagus, beans, peas, cabbage, carrots, celery, lettuce, corn, spinach, tomatoes, oranges.

Why will an infant fed on modified cows' milk get a smaller amount of mineral matter than it should?

The per cent. of salts in human and cows' milk is about the same and when the latter is diluted sufficiently to reduce the protein to their comparative proportion the amount of salts is much lessened.

How long should water for drinking, that is thought to contain disease germs, be boiled? Why not longer?

One to three minutes. As the digestive juices act as antiseptics, it has been found that boiling water for this length of time will render it safe for drinking and doing so longer makes it so insipid that people are not likely to drink as much as they should.

Why is boiled water insipid? How can this condition be somewhat rectified?

Because of the loss of salts and gases. By repeatedly pouring the water from one pitcher to another, thus exposing it to the air.

What proportion of the human body consists of water?

About two-thirds.

What is the average amount of water taken into the system daily, in liquid and solid food.

About four pints.

What are some of the uses of water in the body?

It supplies fluid for the body; it acts as a solvent for the food and thus aids in digestion; it enters into tissue formation; it helps in several ways to prevent an excess of waste matter accumulating in the body.

Digestion and Absorption of Foods

What is the nature of the processes of digestion?

Mechanical and chemical.

What are the mechanical processes?

Mastication, deglutition, the churning motion of the stomach, the peristaltic action of the intestines, defecation.

Mention factors that control digestion.

The nervous system and the enzymes, hormones, etc., of the digestive juices. See appendix, page 377.

Name the digestive juices.

Saliva, gastric juice, pancreatic juice, intestinal juice, bile.

Name the ferments of the saliva and their action.

Ptyalin which changes starch to dextrin and maltose; maltase, which changes maltose to dextrose.

Name the ferments of the gastric juice.

(1) Rennin which curds milk; (2) pepsin which, plus hydrochloric acid, commences the digestion of proteins,

changing them to metaproteins, proteoses and peptones; (3) lipase, which splits emulsified fats, as cream, to fatty acids and glycerin.

Mention the ferments of the pancreatic juice.

Amylopsin, which, like the ptyalin, changes starch to dextrin and maltose; trypsinogen, which, when changed to trypsin by enterokinase, splits proteins to proteoses and peptones; steapsin or lipase which splits fats to fatty acids and glycerine.

Name the ferments of the intestinal juice.

Erepsin, which, continuing the work of the trypsin, changes proteoses to peptones and amino acids; sucrase, which inverts sucroses to glucose and levulose; maltase, which changes maltose to glucose; lactase, which changes lactose to glucose and galactose; enterkinase which activates trypsinogen.

What is the action of the bile?

It helps in the saponification and absorption of fats and by so doing tends to prevent putrefaction in the intestines.

What name is given to the substance resulting from gastric digestion?

Chyme.

What from that of intestinal digestion of fats?

Chyle.

What is the reaction of the various digestive juices?

The saliva, pancreatic juice, intestinal juice, and bile are alkali; the gastric juice, acid.

Why should infants not be given starch unless pre-digested?

Because they have no ptyalin in their saliva.

Mention some factors that influence the secretion of digestive juices and ferments, and state their effect.

(1) The kind and amount of food eaten: an exclu-

sive meat diet produces an abundant flow of gastric juice poor in enzymes; a diet of carbohydrates, a small secretion of juice rich in ferments; milk, a moderate flow of gastric juice with a medium proportion of enzymes. (2) An agreeable odor or pleasing taste will, through the influence of the sympathetic nervous system, increase the secretion of digestive juices, especially when a person is hungry. (3) Lack of appetite, fatigue, strong emotion, sleep, or hard work immediately after eating will all decrease the secretion of digestive juices.

What are some of the more common causes of indigestion?

Overeating; eating too rapidly; eating improper food; food that is badly cooked or too highly seasoned; the use, in excess, of alcoholic liquors; excessive exercise too soon after eating; interference with the circulation of blood in the stomach by wearing tight corset or by constantly bending forward.

Absorption and Metabolism

In what part of the body does absorption of food take place?

Chiefly in the small intestine, to a slight extent in the stomach and large intestine.

Define metabolism.

The changes that occur in food-stuffs from the time they are absorbed until they are eliminated. This includes tissue changes, since tissue is made from food.

Mention important factors in metabolic processes.

The nervous system, the oxygen taken in by the lungs, various enzymes contained in the tissues, and internal secretions.

What happens to glucose after absorption?

It is carried via the portal vein to the liver where it is changed to glycogen and as such stored in the liver and tissues until required. Glucose is constantly passing from the blood into the tissues where it is oxidized, but the blood, normally, maintains a constant content of about 0.1 per cent.; because the glycogen is changed back to glucose and absorbed by the blood as required. The exact nature of the stages through which glucose passes in the process of oxidation is unknown, but various acids are formed and finally, carbon dioxid, and water. It is excreted in the two last-named forms. When more glucose is absorbed than is necessary for the energy needs of the body it may be built into fatty tissue.

What happens to fats during and after absorption?

The soap formed in digestion is reconverted into fat during its absorption into the lacteals. This fat is carried by the lymph to the thoracic duct whence it is emptied into the blood. It gradually passes from the blood to those parts of the body where it is needed for fat tissue or where it can be oxidized and thus decomposed to carbon dioxid and water, which are excreted.

What is the fate of proteins?

They are absorbed by the capillaries of the villi lining the intestine and carried, via the portal vein, to the liver through which they pass before entering the general circulation. No amino acids or peptones are found in the blood so it is supposed that, either during absorption or in the liver, they are changed to blood-proteins. Some of this protein is used to repair tissue waste and, in the case of children to build new tissue. The nitrogenous portion of that not required

is changed, it is thought in the liver, to urea and similar substances, carried to the kidneys, and excreted. The C O H portion of the protein molecule is used in the same way as fat and glucose.

Of what use is the oxidation of food-stuffs to the body?

It gives rise to heat and to the energy essential to maintain the systems of the body at work and for all external activity.

(a) What are the main factors upon which the amount of food needed by the body depend? (b) Consequently, what conditions must be taken into account when regulating the diet?

(a) Muscular activity and the amount of body surface from which heat can be lost by radiation and evaporation. (b) Mode of life, age, sex, size, climate and health.

(a) How is the amount of heat generated in the body registered and (b) recorded?

(a) By the calorimeter, (b) in calories.

How much heat does a calory represent?

The amount required to raise 1 c.c. of water 1°C.

How much heat will (a) 1 gram of protein yield to the body? (b) 1 gram of fat? (c) 1 gram of carbohydrate?

(a) 4 calories. (b) 9 calories. (c) 4 calories.

What proportion of each of these food elements and how many calories did Prof. Atwater give as a standard for (a) a man doing moderately hard labor? (b) a man at light labor? (c) a man at rest?

	Protein	Fat	Carbohydrates	Calories
(a)	150 grams	150 grams	500 grams	3950
(b)	125 "	125 "	400 "	3225
(c)	90 "	and fats and carbohydrates in sufficient amounts to furnish, together with the protein,		
				2450 calories.

What proportion of a man's allowance does a woman require?

About four fifths.

How much food compared to a man's ration, does a youth of 14 to 16 require?

The same amount as a man at light labor.

How much food do children the following ages require, (a) 10-13, (b) 6-9, (c) 3-5, (d) 2 years?

(a) six tenths, (b) five tenths, (c) four tenths, (d) three tenths that of a man doing light work.

Mention some of the methods used in determining the quantity of food required.

The various kinds of food have been burned in a calorimeter and the amount of heat resulting from the combustion ascertained. By the use of other forms of calorimeters, the amount of heat given off by the human body under different conditions has been found. The amount of waste matter given off through the excretory organs has been estimated and compared with the quantity of food eaten. The amount of food eaten by healthy people engaged in various occupations in different countries has been investigated.

Milk

Why is milk sometimes called a perfect food?

Because it contains the five food principles—i.e., proteins, fats, carbohydrates, water, salts.

Why does milk not deserve this name, and what are the principal discrepancies?

Because, though the milk of every class of animal is suitable for its young, the constituents are not in proper proportion to give nourishment to adults leading an active life. The discrepancy is an excess on water and deficiency of carbohydrates.

Name the proteins, carbohydrate, and fat of milk.

The principal proteins are lactalbumin and caseinogen; the carbohydrate is lactose; the fat, cream. the principal constituents of which are the glycerides of palmitic, stearic, and oleic acids.

State the average proportion of the constituents of cow's milk.

Water		87 to 88%
Protein	{ Caseinogen 3. }	
	{ Lactalbumin .50 }	3.50 to 4%
Sugar		4 to 5%
Fat		3.5 to 4.5%
Mineral		0.7%

To what is the souring of milk due?

To acid fermentation resulting from the breaking down of the lactose of the milk by bacteria.

Mention some essential points in the care of milk and state reasons.

(1) The milk should be chilled as soon as drawn from the cow, it is then at a temperature favorable for the growth of germs, which, as there are always a certain number in the cow's udder, are present even when every precaution is taken; (2) cleanliness of everything that will come in contact with the milk, the milker's hands, cow's udders, milk cans, and bottles—the milk cans and bottles must be also sterilized; (3) milk should always be kept in the lowest compartment of the refrigerator and by itself, because it absorbs odors very readily and as odors rise and cold air falls the lowest compartment of the refrigerator is the coldest and purest.

How would you sterilize milk?

Raise it to a temperature of 212° F., and keep it there for one half hour.

What is the chief objection to the use of sterilized milk for infants?

When the milk reaches a temperature of 170° F. the lactalbumin coagulates and forms in a scum on the top of the milk, and, in doing so, it takes some of the salts of the milk. Thus, infants given sterile milk are deprived of a valuable protein and salts which they should have for the hardening of their bones, etc., and, consequently, they frequently become rachitic.

How is milk pasteurized?

It is raised to a temperature of 140° to 160° F. and kept there for from twenty to thirty minutes.

What must be done to the milk immediately upon removal from the fire? Why?

It must be chilled as quickly as possible and kept at a low temperature until ready for use. If milk is only raised to a temperature of 160° F. the bacteria are killed but not their spores and, unless the temperature of the milk is sufficiently reduced (*i.e.*, is 40° F.) these will soon develop into bacteria.

How is this usually done?

By placing the vessel containing the milk in cold water and surrounding it with ice, or, if the vessel is of glass or other breakable substance, by standing it in lukewarm water and chilling the water, by the addition of ice, as quickly as possible without breaking the utensil.

Which of the constituents of milk is not always easily digested? Why?

Caseinogen. Under some conditions (*e.g.*, when the gastric juice is too acid) it is formed into a hard curd.

Mention some common methods used to render milk more easily digested, and their action.

(1) The addition of aerated waters, the gases of which keep the caseinogen apart and so prevent the formation of a hard curd. (2) The addition of barley water, the granules of the barley flour, small though they are, accomplish the same result and, owing to their mucilaginous nature, to a greater extent; (3) diluting the milk with pure water has to a certain degree the same effect; (4) the addition of lime water or milk of magnesia, these render the milk alkaline and so prevent the formation of a hard curd; (5) heating the milk, this causes certain changes in the caseinogen which interferes with the clotting of the milk by the rennet; (6) peptonizing the milk, it is thus partly digested.

Why are koumiss and buttermilk more easily digested than plain milk?

The caseinogen being already curded is not formed into a hard clot.

Why is the nutritive value of skimmed milk not very much less than that of whole milk?

Because it contains, practically, all the protein and carbohydrate, as only a very small percentage of these rise with the cream.

What part of milk is contained in whey?

Water, lactalbumin, lactose, and salts.

What are the more common adulterations of milk?

The removal of cream; the addition of water; the addition of chalk or other coloring matter to improve the color of the milk when it has been diluted; the addition of such chemicals as borax, soda, salicylic acid, formalin, etc., to prevent the souring of the milk.

Mention some important points to remember when heating milk, and give reasons.

It must be kept covered, to prevent the escape of gases; it must not be heated to a temperature exceeding 168° F., to avoid the coagulation of the lactalbumin and consequent loss of albumin and salts.

Eggs

State the average proportion of the food principles in the edible portion of a hen's egg.

Water 73.7%. Protein 13.4%. Fat 10.5%. Mineral matter 1.0%.

Of what does the white consist? What the yolk?

The white consists of albumin, water, and salts, the salts are chiefly chlorids. The yolk is chiefly composed of vitellin; lecithin; fat, which is largely olein and palmitin; phosphates; iron compounds; sulphur.

Mention factors that influence the digestibility of eggs.

(1) Their age, the fresher the egg the greater its nutritive value and the more easily digested; (2) if raw or cooked; and (3) the manner of cooking, a raw egg is more easily digested than a cooked one, a soft cooked, than one cooked hard, one cooked until the yolk is mealy than one mediumly hard, and an egg cooked slowly is more easily digested than one cooked quickly; (4) the condition of the patient, under some circumstance, eggs, especially the yolks, are not easily digested.

Mention some of the signs of a fresh egg.

(1) The shell of a freshly laid egg is slightly rough; if held to the light a fresh egg will appear translucent, with no spot visible; (3) a fresh egg will sink in salt

water, an indifferent one will float, and a bad one will float even in fresh water.

Why is a bad egg lighter than a fresh one?

(1) Because an egg loses water by evaporation through the shell; (2) because bacteria, which enter through the shell, the shell being porous, decompose the substance of the egg, converting it into gases which are lighter than the solid substance.

How can eggs be preserved?

By keeping them in a temperature below which bacteria can develop (35° – 40° F.), as in cold storage, and by the exclusion of air.

Mention the points necessary to consider in choosing a substance in which to pack eggs.

It should be a substance which will pack tightly; which is antiseptic, or, at least, of a nature unfavorable for germ development; and which will not impart a flavor to the eggs.

Mention some of the methods used to exclude air.

Packing the eggs in salt, immersing them in a solution of sodium or potassium silicate (both of these solutions are commonly known as *water glass solution*) or of lime.

How do you prepare water glass solution?

Dissolve one part of silicate in twenty parts of water which has been boiled and cooled.

What must be done to eggs preserved in water glass solution or lime before "boiling them"? Why?

A hole must be made in the shell; because the solution closes the pores of the shell, and as the air in the egg is expanded by the heat, it, having no outlet, will break the shell of the egg.

What advantage has the water glass solution over lime?

It will not, as lime sometimes does, flavor the egg, nor cause changes in the whites which prevent them holding air and becoming frothy when whipped.

What is the principal point to remember in cooking eggs?

That if the albumin is coagulated quickly or to too great a degree, it will be toughened.

Fish

What is the principal protein in fish?

Albumin.

Mention the signs of a perfectly fresh fish.

The eyes are bright and protruding, the scales bright, the fins and tail are stiff, and there is no disagreeable odor.

Which contains the larger percentage of nutriment, fish or meat?

Meat.

(a) Which is the more easily digested, dark fish or white? Why?

(a) With the exception of cod, white fish are more easily digested than dark; (b) in white fish the fat is situated in or around the liver, while in dark it is scattered through the fish.

Why are oysters so much used in invalid diet?

They are easily digested and supply all five food-principles.

What form of carbohydrate is found in oysters?

Glycogen.

How would you cream oysters for one person?

Take 1 teaspoon butter, 1 teaspoon flour; $\frac{1}{4}$ cup oysters, $\frac{1}{3}$ cup milk, $\frac{1}{8}$ teaspoon salt. Mix salt and flour, and put into a small saucepan with butter, as the

butter melts stir in the flour. Add milk, slowly, and cook about ten minutes in double boiler. Heat the oyster juice to about 200° F. and put in oysters. Let them remain *below boiling point*, until plump. Add to sauce.

Meat

Describe the composition of meat.

Meat is composed of hollow muscular fibers, held together by connective tissue, with a certain amount of fat interspersed between the fibers. In the hollow, or tube, of the fibers there is a watery fluid containing albumin, salts, and extractives.

Name the principal proteins of meat.

Myosin, albumin, gelatin, and extractives.

In what meat is carbohydrate found? Why is it not present in other meat?

In liver. After an animal is killed, the glycogen in the muscles is changed to glucose and oxidized to acid and carbon dioxid.

Of what value are the meat-bases or extractives?

Much of the characteristic flavors of the various meats are due to their extractives, also, they are slightly stimulating, and they assist digestion by exciting the flow of gastric juice.

Why are extractives so called?

Because they are readily extracted from meat if stood in cold or warm water.

On what does the proportion of water in meat depend?

On the age of, and amount of fat in, the animal and the part of the animal from which the meat is taken.

How long after killing, should meat "hang" before being used?

Beef should hang at least three weeks, mutton is better if it is kept longer, but the flesh of young animals is immature and spoils quickly, it is therefore better if used in a few days.

What parts of the meat make the best soups and why?

The neck, lower part of the legs, and around the tail. They contain a larger proportion of juice and extractives than other parts of the animal.

From which part of the animal are the best steaks and roasts obtained, why are these cuts best, and how can they be improved?

The upper part of the hind-quarter. Cuts from that part of the animal, though less juicy are more tender than any others. As they are lacking in juice, and consequently extractives, they will be improved if, just before serving, juice extracted from the neck or round is poured over them.

Which cut of beef is best for beef-tea, and why?

The round is the best for beef-tea because it is comparatively free from fat and contains a large per cent. of juice and extractives.

Which is generally considered the most nutritious of the meats?

Beef.

What are the signs of good beef?

The meat is firm, fine grained, well mottled with fat, it is bright red and juicy, has but slight odor, and the fat is a light straw color, and firm.

Which are about the most indigestible of the meats?

Pork and veal.

Why are they so?

Pork is not easily digested because it contains such a large per cent. of fat; veal, because it is deficient in salts and extractives.

What are the signs of good veal, and of that from an animal which has been killed too young?

Good veal is fine grained, tender, and of a light pinkish color, the fat is clear, firm, and white. Veal from a calf less than six weeks old has soft flabby flesh and bluish watery appearance.

What is the effect of cooking on meat?

The connective tissue is softened, but the albumin is hardened, the flavor is developed, appearance improved; germs are destroyed; the amount of water and the fat and mineral matter are lessened.

What are sweetbreads?

The pancreas and thymus gland of the calf and lamb.

Give a recipe for creaming a sweetbread.

Let the sweetbread stand in sufficient cold water to cover it for one hour. Drain off the water; remove the membrane and pipes. Put the sweetbread in a saucepan of boiling water to which has been added one half tablespoon of salt and the same of vinegar. Boil twenty minutes, drain, plunge in cold water and drain again. Cut the parboiled sweetbread into small cubes. Cover with *white sauce*. Stand saucepan in a hot place until sweetbread is thoroughly heated. To make the white sauce take 1 teaspoon flour, 1 teaspoon butter, $\frac{1}{2}$ cup milk, $\frac{1}{8}$ teaspoon salt. Mix the flour and salt, put in small saucepan with butter. As the butter melts, stir in the flour, when well mixed add the milk, slowly. Cook for ten minutes in a double-boiler.

How is meat prepared for roasting, how roasted, and how long will a piece of beef five pounds in weight require for roasting.

The meat is wiped with a damp cloth, put on drip-

ping rack, the surface of meat rubbed with salt, meat and pan dredged with flour, and, except when the meat is very fat, trimmings of fat or dripping are put around it. If the meat seems tough a little hot water is put in the pan. It is placed in a hot oven. After the surface of the meat is seared, which, if the oven is the right temperature, will be in about eight minutes, the heat is reduced. The meat is basted with the fat in the pan every eight or ten minutes. A five-pound piece of beef will require one hour five minutes to roast, rare.

(a) Why is the meat wiped off with a damp cloth instead of being put into a pan of water? (b) Why should the oven be very hot when the meat is first put in and (c) the heat reduced in a few minutes.

(a) If the meat is put into water the 'extractives will be dissolved out. (b) The meat is put into a very hot oven in order to coagulate the surface albumin of the meat and so prevent the escape of extractives. (c) The heat is reduced as soon as this is accomplished, as otherwise the albumin would be hardened and the outside of the meat burned before it is cooked in the center.

Describe a method of making beef-tea and give reasons for procedures.

Take the quantity of meat required, preferably round steak or rump, and for every pound of meat, take one pint of water and $\frac{1}{2}$ teaspoonful of salt. Wipe the meat with a damp towel, remove fat, cut in $\frac{1}{2}$ inch cubes, put in a canning-jar, add cold water, let stand for $\frac{1}{2}$ hour. Place jar on trivet in a kettle containing sufficient cold water to surround that in the jar. Heat the water very gradually to 140°F . Keep it at this temperature for two hours. Add the salt,

then slowly increase the heat until it causes the tea to become a deep chocolate color. If desired, add pepper. Strain.

The meat is allowed to stand in cold water in order to dissolve out the extractives; it is kept at a comparatively low temperature because they will coagulate very readily, also, the superficial albumin in the meat will coagulate and, forming a crust around it, prevent the escape of the extractives.

Poultry, Game

Mention the kinds of poultry most easily digested, and state why they are.

Squab, pigeon, chicken, and fowl are all easily digested, because their flesh is in short fibers and not intermingled with fat.

Why is game not good for the sick?

It contains such a large per cent. of extractives that it is often irritating to the mucous membrane of the stomach.

Mention conditions that indicate good poultry.

The bird is plump and short in proportion to its weight, the skin is fairly smooth and tears easily under the wings; there is no odor.

Mention some distinguishing marks between a chicken and a fowl.

The chicken has a larger number of pin-feathers, and its breast-bone is pliable. In the fowl the pin-feathers are largely replaced by long hairs.

Gelatin

Name the gelatinoids, and state where they are found.

Ossein, found in bone; collagen, in connective tissue and tendons; chondrigen, in cartilage

Which of the meats is particularly rich in gelatinoids?
Veal.

What name is given to gelatin made from the swim bladder of the sturgeon?

Isinglass.

What happens to gelatin if allowed to stand in cold water, and what is it then said to be?

It absorbs the water and swells. It is then said to be "hydrated."

What happens to gelatin if allowed to boil for many minutes?

It is decomposed and will not solidify on cooling.

Why cannot gelatin build tissue or repair waste?

Because, though it contains nitrogen, it lacks some elements necessary for tissue building.

What is its value in the diet.

It is easily burnt in the body, and so saves the proteins from destruction. Many delicate and nutritious dishes can be made with its help, and, being of a mucilaginous nature, it often has a certain soothing effect on an irritated stomach.

What is the name of the gum or vegetable gelatin which allows of certain fruits being made into jelly?

Pectin.

Plant Foods

Give the division of plant foods.

Cereals, vegetables, fruits, nuts, fungi, algæ, lichens.

Name nitrogenous substances found in plants, and state in which class of plants the various ones are found.

Gluten, and gliadin, in some cereals; legumin, in the

legumes,—*i. e.*, beans, peas, lentils,—vegetable albumin, in some vegetables; amids, or vegetable extractives, in vegetables.

Cereals

Name and describe the different parts of cereals.

(1) Bran or the cellulose of cereals; this constitutes the outer layers. It is of a coarse and woody nature, contains a considerable amount of mineral matter, and, in some grains, a certain percentage of protein. (2) The embryo or germ, from which a new plant develops; it is rich in fat and, in some grains, in protein. (3) The kernel or seed is the part in which the starch is stored up for the food of the germ.

How do cereals rank with other plant foods, in regard to nutritive value?

Weight for weight, they will yield more nutriment than any other plant food.

What constitutes their chief value?

Their starches and salts.

What constitutes the special value of barley?

It contains a large per cent. of mineral matter, especially phosphates and iron.

Why is oatmeal specially valuable?

It is richer in fats, proteins, and minerals than the majority of cereals.

How should it be prepared for small children and invalids? Why?

It should be strained after cooking, in order to remove the cellulose which is irritating to the intestine.

What constituents of wheat allow of its being made into bread and why do they do so?

Its proteins; *i. e.*, gluten and gliadin. Wheat

contains more of these proteins than other cereals and they, especially gliadin, being adhesive and expansive hold the gas formed in dough either as the result of fermentation caused by yeast or by the action of baking powder. This gas, being expanded by heat causes the dough to rise.

What difference is there in flours made from winter and from spring wheat? Which is best for bread and which for pastry?

Flour from spring wheat contains a large amount of protein and is the best for bread; that from winter wheat contains more starch and less protein and is the best pastry flour.

Why is bread made from Graham or whole wheat flours considered better than that made from white flour.

Graham and whole wheat flours contain more of the outer coats of the grain and therefore more protein and salts, and, also, bran which acts as an intestinal irritant and helps to prevent constipation.

How should cereals be cooked?

The grain cereals are scattered, slowly, into boiling salted water, while it boils; boiled ten minutes, and then cooked the length of time required by that particular cereal, in a double boiler. The flour cereals are often made into a paste with cold water before being combined with the boiling water.

Why do cereals require long cooking?

In order to partially dextrinize them; they require so little mastication that they do not become sufficiently well mixed with the saliva for the ptyalin to do the dextrinizing.

Why should gruels not be made entirely of milk?

Because cereals require to be exposed to a high

temperature for a long time, and this causes deleterious changes in the milk.

Give a recipe for making Indian meal gruel.

Take 1 tablespoon granulated Indian meal, $\frac{1}{2}$ tablespoon flour, 3 tablespoons cold water, $\frac{1}{4}$ teaspoon salt, $1\frac{1}{2}$ cup boiling water, $\frac{1}{2}$ cup warm milk. Mix meal, flour, and salt, with cold water, add hot water, gradually, stirring constantly. Boil one and one half hours. Add milk, and reheat. Serve with cream if desired.

BATTERS AND DOUGHS.—*What are batters and doughs?*

Mixtures of flour and liquid, and, as a rule, such ingredients as butter, sugar, salt, etc.

What is the difference between a batter and a dough?

A batter is a mixture that is thin enough to pour or to drop from a spoon, doughs are sufficiently thick to knead.

How are doughs and batters made light?

By introducing air or gas into them.

What are the more common methods of introducing air?

By beating, or by the addition of beaten eggs.

How is gas usually introduced?

By the addition of yeast, or of an acid and alkali, such as cream of tartar and soda bicarbonate, sour milk and soda, molasses and soda, baking powder, which usually consists of one part cream of tartar to two of bicarbonate of soda and a little starch or flour.

Why is starch or flour used in baking powder?

Because it restrains the effervescence of the gas.

How do gas and air make these mixtures light?

When exposed to heat the gas and air are expanded, and the mixture is thus puffed up and lightened.

What is an important thing to remember when using baking powder, etc., not yeast, to make a batter light.

That it must be put into the oven as quickly as possible as otherwise the gas or air will escape.

What is yeast?

A one-celled plant that multiplies by budding and contains enzymes which change flour to dextrose, dextrose to alcohol, alcohol to CO_2 and water.

Vegetables

Name the different classes of vegetables, and give examples of each class.

(1) Legumes or pulses; examples: peas, beans. (2) Roots and tubers; examples: potatoes, turnips, beets. (3) Green vegetables; examples: cabbage, lettuce, spinach.

Why are peas and beans valuable foods in health, but unsuited for use in some abnormal conditions?

They contain a large proportion of protein, and thus can, when necessary, take the place of meat; they also contain a large percentage of salts, and a good supply of carbohydrates. They cannot always be taken by those whose digestion is impaired, because they contain a considerable amount of cellulose which, under some conditions may be too irritating to the intestine. Also, they contain sulphur and, when absorption is delayed, this is likely to combine with hydrogen and form a gas—sulphuretted hydrogen—and cause flatulence.

Have the roots and tubers a high nutritive value? Why?

With the exception of potatoes, the roots and tubers have not a high nutritive value; because in

cooking so much of their carbohyhydrate substance is lost.

How can potatoes be cooked to avoid loss of salts.

Without being peeled.

Of what use are green vegetables in the diet?

Their salts constitute their chief food value, but they are also valued for (1) their flavor; (2) adding bulk to the diet without greatly increasing its fuel constituents—they are about 95 per cent. water—; (3) helping to prevent constipation.

What vegetables should be allowed to stand in water for some hours before cooking?

All dried vegetables, those that are shrivelled or wilted, and green vegetables.

(a) How should cabbages, Brussels sprouts, and cauliflower be placed in the water, what should be added to the water? (b) Give reason.

(a) With their heads down, one half tablespoon of salt for every quart of water should be added to the water. *(b)* If there are worms in the head this will cause them to come out.

What is a good rule to follow in selecting vegetables as regards their size? Why?

To select vegetables of medium size, small rather than large. They are cheaper because more come in a given measure, and better as the large vegetables are sometimes old and tough and poor in flavor.

Mention some important items in the care of vegetables.

Winter vegetables, with the exception of squashes, should be kept in a dry, cold place and packed in barrels or bins to exclude air. Squashes should be spread out in a dry, rather warm place. If dark spots begin to appear on squashes they should be used at

once. Summer vegetables should be cooked as soon as possible after they are gathered.

What is the usual method of boiling vegetables?

To put them into freshly boiling salted water and cook them until soft.

What can be done to mitigate the strong flavor and odor of onions and cabbage?

Add bicarbonate of soda to the water. One teaspoon of soda for every quart of water.

Why will bicarbonate of soda mitigate the flavor?

It disintegrates the oil which is the cause of the strong flavor.

Mention a class of vegetables in the cooking of which salt should not be put into the water until cooking is nearly completed, and state why this is so.

The legumes. Salt hardens legumin.

Should vegetables be covered or uncovered during cooking? Why?

Strongly flavored vegetables such as cabbages, onions, and turnips, should be cooked uncovered, and the water should be partly changed every fifteen minutes so as to get rid of gases and other substances liberated during cooking. Vegetables with green color and those not strongly flavored should be cooked covered; in the case of the former, to prevent loss of color.

Which are the more easily digested, boiled or baked potatoes? Why?

Baked potatoes. (1) They are more mealy and the digestive juices can thus more easily envelop the starch granules. (2) They can be subjected to a greater degree of heat, and for a longer time, than when boiled, and are thus more nearly dextrinized.

Describe method of baking potatoes.

Select smooth potatoes of medium size. Scrub thoroughly and place in a hot oven. Bake until soft—about forty minutes. Pierce the skin with a fork, in two or three places, *immediately* upon removal from oven.

Why are the potatoes pricked with a fork immediately upon removal from oven?

To allow the steam to escape, otherwise the steam condenses and the potatoes become soggy.

Nuts, Fruit, Fungi

Are nuts a valuable food?

They have a high food value, but, owing to their having a large proportion of fat and cellulose, they are not always easily digested.

How can they be prepared so that they will be more easily digested?

By mincing them and mixing them with salt.

Have fruits a high food value?

Fruits contain such a large proportion of water that few of them supply much nourishment, but their acids and free salts make them a very important item of diet.

What are the principal carbohydrates in fruit?

Levulose and glucose.

What are the more common salts of fruits?

Potash, lime, iron, magnesium.

Name the gum present in some fruits which allows of their being made into jelly.

Pectin, or vegetable gelatin.

Name the common edible fungi.

Truffles and mushrooms.

Mention the more common marks of distinction by

which mushrooms can be distinguished from poisonous fungi.

The poisonous fungi are brightly colored, have a scaly or spotted surface, flesh that is either tough or watery and, as a rule, they grow in damp, shady places. Mushrooms are not highly colored, they are usually of a dull red or brownish hue; they are neither scaly nor spotted; have a rather agreeable smell, their flesh is brittle, and they grow in dry places.

Food Adjuncts or Condiments

(a) What are food adjuncts or condiments? (b) In what way are they valuable, and (c) when are they injurious?

(a) Food adjuncts are spices, flavoring extracts, and like substances which are added to food for the purpose of improving its flavor. (b) When not used in excess they are valuable additions to food; because by improving its odor and taste they, through the sympathetic nervous system, increase the flow of digestive juices, and thus aid in digestion. They also act as mild counter-irritants in the stomach and intestines, and so increase still further the secretion of digestive juices. (c) When taken in too large quantities this counter-irritation is too severe and often proves harmful, and in disease, especially if there already is an irritation, even a slight amount may prove injurious.

Beverages

State the composition of tea.

The more important constituents of tea are theine, tannic acid, and a small quantity of volatile oil to which it owes its flavor.

Mention (a) the beneficial effects of tea, (b) its injurious actions, and state to which of its constituents these results are due.

(a) Owing to theine, tea is stimulating and refreshing; owing to the tannin it retards waste. Tea is therefore beneficial when tired, or during hard labor, and for the old. (b) The theine is exciting to the nervous system, the tannin, by virtue of its astringent action on the mucous membrane of the stomach, retards digestion by lessening the flow of gastric juice. Tea is therefore bad for those of a nervous disposition, for those subject to attacks of indigestion, and for children.

(a) What is the difference between green and black tea; (b) which retards digestion the least; why?

(a) The leaves of black tea are fermented before drying, those of green are not. (b) Black tea retards digestion to a slighter degree than green, because fermentation renders the tannin less soluble.

What must be avoided when infusing tea in order to extract as little of the tannin as possible?

The tea must not be allowed to boil nor should it be allowed to steep more than five minutes.

Give a recipe for making tea.

Allow 1 teaspoon of tea for each cup and 1 "for the pot." Use freshly boiling water. Scald the teapot. Put in the tea, let stand a few seconds until the tea-leaves become heated, then add the boiling water.

Why is not water that has been boiling some time as good for making tea and coffee as that freshly boiled?

When water is boiled for any length of time, a large portion of its salts is lost, and, consequently, beverages made with it are lacking in taste.

Name the more important constituents of coffee.

Caffeine; caffcol, a volatile oil; and caffeic acid, a substance similar to tannin.

What are the good and bad effects of coffee?

The same as those of tea, but as there is less caffeic acid in coffee than tannin in tea, coffee retards digestion to a somewhat less extent than tea.

From what are cocoa and chocolate made, and what are the chief differences between them?

They are both made from the seeds of the cacao bean. Chocolate is mixed with starch, sugar, and, as a rule, a flavoring extract. More fat is extracted from the seeds for cocoa than for chocolate.

What is the average per cent. of fat in cocoa and chocolate?

Cocoa contains about twenty-five to forty per cent.; chocolate, thirty to fifty per cent.

To what do chocolate and cocoa owe their stimulating property?

To a substance that somewhat resembles caffeine, called theobromine.

Feeding of Infants and Children

What is meant by the modification of milk?

Changing the nature of cow's milk so that it will nearly resemble that of human milk.

What are the more important differences between cow's and human milk?

(1) The food principles are not in the same proportion. (2) Human milk curds in small flocculent curds, under the influence of the gastric juice, while cow's milk forms in a large firm mass. This is largely due to two factors: (a) the protein substance of human milk consists of two thirds lactalbumin and one

third caseinogen; cow's milk contains five sixths caseinogen and one sixth lactalbumin; (b) human milk is more decidedly alkaline than cows, and is therefore not so easily influenced by the rennet and acid of the gastric juice.

Give the proportions of the food principles in human milk.

Protein	1 to 2%
Fat	3 to 4%
Lactose	6 to 7%
Mineral	1 to 2%
Water	87 to 88%

Compare this with the proportions of cow's milk.

Human milk has only about half the amount of protein that cow's milk has, nearly twice as much sugar, and more than twice the amount of salts; the fats and water are about equal in the two milks.

How is the amount of carbohydrate in cow's milk increased?

By the addition of lactose (sugar of milk). About one ounce to every twenty ounces of milk.

How can the proportion of protein be diminished without changing that of the fat?

Either by diluting the whole milk until the protein is sufficiently reduced and then adding enough cream to give the required percentage of fat, or by putting the milk into a sterile glass quart bottle and allowing the cream to rise to the top, and then removing as many ounces of this as are required to get the protein and fat in correct relation with each other, and diluting this to the per cent. of fat required in the milk mixture.

How it is possible that by removing the cream, you can

get the fat and protein in correct comparative proportions?

Only a comparatively small portion of protein rises to the top of the milk with the fat; therefore, the smaller the quantity of cream removed, the more fat and less protein will it contain.

How much cream would you take from a 4% milk to get a milk in which there was one part protein to two of fat?

Sixteen ounces.

What would be the percentage of fat in this milk?

7 per cent.

What would be the percentage of fat, if you removed the upper ten ounces from the milk?

10 per cent.

What would be the comparative proportion of protein to fat in a 10% milk?

One part protein to three of fat.

If a prescription called for 3% fat and 1% proteid what per cent. top milk would you use?

10 per cent.

Does human milk remain the same during all the months of lactation?

No, it undergoes a slow but continual change.

In about what proportions are the protein, fat, and carbohydrate generally given to a baby one week old?

Fat 2%, protein 0.60%, carbohydrate 6%.

In what proportions are they usually given to a baby four months old?

Fat 3%, protein 1.50%, carbohydrate 6%.

With what is the milk or cream usually diluted?

A cereal water. Barley water is very frequently used.

Why is a cereal water so often used in preference to plain water?

A cereal water assists in preventing the formation of a hard curd in the stomach. It also affords additional nourishment.

Why is lime water sometimes added to the milk? Why is it not now used in infant feeding as much as formerly?

To prevent the formation of hard curds in the stomach. It was found that the alkali interfered with gastric digestion, the milk being digested in the intestine, and, consequently, that the development of the gastric glands was retarded.

(1) How much milk would you give and how often would you feed a baby, (1) one week old; (2) between two and three months old?

(1) Between one and one half ounces, every two hours from 6 A.M. to 8 P.M. and every three hours during the night. (2) 4 to 5½ ounces every three hours between 6 A.M. and 10 P.M.; none at night.

Mention some abnormal conditions that usually indicate errors in diet which are to be watched for and reported to the doctor.

Loss of, or failure to gain in weight; the passage of too frequent stools; constipation; green stools; curds in the stools; colic; vomiting.

What does a loss of weight or failure to gain in weight, though there are no symptoms of disease, usually indicate?

That there is not sufficient sugar in the food.

Mention some symptoms of a too great per cent. of sugar in the food.

Green, acid, watery stools with irritation of the buttocks; colic.

What do curds in the stools often indicate?

If the curds are soft, that the child is getting too

much fat; if the curds are hard, that it is getting too much protein.

When not the result of disease, to what may vomiting be due?

To too much food; to a too high percentage of fat or proteid.

Mention two foods often given infants when they are unable to digest milk.

Cereal water and whey.

What part of the milk is contained in the whey?

The lactalbumin, lactose, salts, and water.

Does whey contain sufficient nutriment to nourish a child for any length of time?

No, it can be only used for a few days at a time.

Mention a very important fact to remember when preparing cereal waters, and state why it is important.

That the cereal must be partly predigested; either by long cooking or by the addition of a dextrinizing ferment. This is particularly necessary in the case of infants, because they have no ptyalin in their saliva until eight months old, and it is not present in any quantity until later.

Which of the food principles would a child not get in sufficient quantity, if fed exclusively with cereal water?

Protein.

Why is a sufficient quantity of protein very necessary during infancy?

During that time a child should increase in size very rapidly, and, therefore, it requires the "tissue-building food."

Give some reasons why proper food and feeding are so important in infancy and childhood.

(1) The enzymes of the digestive juices are either absent or not present in sufficient quantity to digest

any but the most easily digested food. (2) The mucous membranes lining the digestive organs of infants and children are much more delicate than that of adults, and therefore more easily irritated. (3) Irritation or other ill effects—such as distention from over-feeding—due to errors of diet in childhood, are apt to lay a foundation for gastric disturbances that will last through life.

How soon is a child given solid food?

About the end of the first year.

Mention some of the first articles you would give, and how many such meals you would give a day.

Cereal jellies, strained cereal gruels, stale bread crumbs, cracker crumbs, or zwieback soaked in milk. At first, only once a day.

How soon is meat given?

If the child is healthy, it is generally given a small amount of meat once a day when it is between eighteen months and two years.

How should the meat be prepared?

By scraping it, so that it will be freed from any connective tissue that cooking has not made absolutely soft.

How should fruit and vegetables be prepared?

They should be passed through a colander.

Name some vegetables and fruit that are particularly good for a child of this age, if treated in this manner.

Baked potatoes, asparagus tips, spinach, Spanish onions, baked apples, apple sauce, prunes.

Mention some foods that should not be given to young children.

Rich pastry or griddle cakes, hot bread or rolls, pork, ham, sausage, salt fish, dried beef, game,

kidney, liver, corn, cabbage, beets, cucumbers, any kind of fried food.

Serving Food

Mention some points that should be remembered when serving food to a patient.

That the tray must be made to look as attractive as possible; clean napery must be always used, the glasses and silver must be polished, the prettiest dishes obtainable must be used and they must be unchipped and clean. Nothing necessary—as for instance, the salt and pepper—must be forgotten. The dishes, etc., should be placed on the tray in, as far as possible, the same order as on the table. All food intended to be hot, should be hot, and should be served on hot plates; and that intended to be cold, should be cold, and served on cold plates. It is, as a rule, better to serve too little than too much.

**Things which every nurse should know how to make
and for which it would be well to learn recipes
before examination**

Tea,
Coffee,
Cocoa,
Several kinds of milk and egg drinks,
Several ways of cooking eggs,
Several gruels and cereal jellies,
Toast—plain, milk, cream,
Milk soups,
Beef tea,
Mutton, chicken, oyster, and clam broths.

To broil steak, chops, birds.

Several light, dainty, quickly made desserts: as jellies, creams, jelly whips, etc.

The following are a few comparative measures which, if remembered, may be of assistance in helping students in getting the quantities in recipes fairly accurate.

1 egg for every $\frac{3}{4}$ cup of milk will be required for a baked or thick steamed custard.

1 egg for every cup of milk for a thin custard.

2 eggs for every cup of flour for a thin batter in which there is little butter and no baking powder. Extra eggs must be used when there is much butter in the mixture. Fewer eggs can be used if there is baking powder. $\frac{1}{2}$ teaspoon is supposed to be equivalent to one egg.

2 teaspoons of baking powder to every cup of flour is about the usual proportion for a thin batter in which there is not much butter.

About 2 teaspoons of sugar is required to sweeten a cup of cold substance such as egg-nog, 1 tablespoon for every cup of like substance that necessitates the cooking for about five minutes, $1\frac{1}{2}$ tablespoon if necessary to cook the sugar longer.

For a thin batter about 1 cup of liquid will be required for every cup of flour; 1 cup of liquid for every 2 cups of flour for a thick batter, 1 cup of liquid for every 3 cups of flour for a soft dough; and 1 cup of liquid for every 4 cups of flour for a stiff dough.

About $\frac{1}{8}$ teaspoon of salt is required to season one egg and for 1 cup of substance such as egg-nog; about $\frac{1}{4}$ teaspoon to a cup is required for broths, beef-tea, and like substances.

Diet in Disease

Mention some diseases in which the diet forms an important part of the treatment or in which errors in diet may have serious consequences.

Anemia, all forms of cardiac disease, constipation, diarrhea, diabetes, all diseases of the stomach, gout, nephritis, phthisis, rheumatism, rickets, scurvy.

What foods are to be avoided whenever dietetic treatment is necessary?

All rich or highly seasoned foods.

What must be remembered in regard to the cooking of food used for invalids?

That it must not only be made palatable, but that the action of heat, water, salts, etc., on the food principles be remembered and the food treated accordingly, in order that there be no unnecessary waste of its nutritive properties and that it may not be rendered indigestible.

What special foods are usually used in the treatment of anemia?

Foods containing a comparatively large amount of iron; e.g., beans, peas, eggs, oatmeal, cornmeal barley, wheat flour—unless too much refined—spinach, lettuce, raisins, prunes, meat—especially rare beef, but the iron in meat is in combination with hemoglobin which is often imperfectly digested and absorbed.

Mention some deleterious conditions that may result from improper diet when a person has a diseased heart.

Increased arterial tension and edema may result from taking liquids too freely; an accumulation of waste in the system may be caused by taking too little

fluid; too much carbohydrate or fat food has a tendency to cause flatulence and thus push up the diaphragm against the heart, and interfere with its movement.

What class of foods are usually used in the treatment of constipation?

Those likely to irritate the intestine: as oatmeal, Graham and rye breads; fruit, especially figs, prunes, apples, and dates; and green vegetables.

What kind of food is given in diarrhea?

Food that is very easily digested and of a bland or mucilaginous nature; such as barley water, whey, scalded milk, strained milk gruels—never oatmeal; milk soups.

What class of foods are restricted in the treatment of diabetes and why?

The carbohydrates are restricted, because glucose is imperfectly oxidized and, consequently, the blood becomes surcharged with it, thereby causing harmful conditions in the system.

Why is it necessary to restrict starches as well as sugar?

Because starch is converted into sugar in the process of digestion.

What class of food is given in as large quantities as possible without causing indigestion? Why?

Fats. In order to replace the carbohydrates in supplying heat and energy.

Mention the more easily digested forms of fat.

Butter, cream, pure olive oil, crisped bacon fat.

What used to be the theory regarding the use of solid food in fever and why was this changed?

It was thought that food, by providing fuel for oxidation caused an increase of temperature, but it was

found that when the heat-regulating centers of the body are disturbed the temperature remains high whether food is taken or not, and, if there are no food derivatives in the system to be used as fuel, the body tissues are oxidized.

Why must only very easily digested foods be given fever patients?

Because during illness, the mechanical action of the stomach and intestines and the functioning of the glands concerned with the secretion of the digestive juices are defective. Consequently, digestion and defecation are retarded, and, unless food is very easily prepared for absorption, it is very likely to remain so long in the stomach and intestines that it undergoes fermentation and putrefaction, thus giving rise to gas and consequent tympanites and to cleavage substances that, when absorbed, cause autointoxication.

What class of organic foods are restricted in nephritis? Give two reasons.

Proteins. (1) All nitrogenous compounds not used for tissue building or repair are eliminated through the kidneys and when these organs are diseased it is necessary to spare them all the work and irritation possible. (2) In nephritis the kidneys sometimes fail to eliminate nitrogenous waste and it is then left to poison the system.

Why is sodium chlorid eliminated from the diet in nephritis if there is edema?

When the kidneys are diseased, they often fail to eliminate excess sodium chlorid from the blood and it passes into the tissues and raises the osmotic pressure in the lymph spaces; consequently, a much larger amount of fluid than normal passes from the blood into the tissues and edema is increased.

What kinds of food are much used in the treatment of obesity? Give examples and reasons.

Foods that have a low caloric value in proportion to their bulk; *e. g.*, spinach, lettuce, asparagus, milk. Much more food can be given if that with a low caloric value forms the main part of the diet and the patient is not as likely to feel hungry nor is constipation as likely to occur as when small amounts of food with a high caloric value are used.

What should be the nature of food used when it is important to give all the nourishment possible and the patient's appetite is poor?

The foods should have a high caloric value in proportion to their bulk; *e. g.*, bacon, butter, cream, oil, salad dressing, whole wheat bread, lactose (as lactose is not as sweet as cane sugar larger amounts can be used), baked potatoes (when potatoes are baked there is not so much loss of nutrient material as when they are peeled and boiled).

Why should particular attention be paid to the diet in the treatment of tuberculosis?

(1) The disease is characterized by excessive tissue-waste and this must be replaced by the food. (2) Indigestion is almost sure to follow errors of diet and, as it is important to give a liberal supply of food, this is a serious complication.

What foods should be avoided or restricted in rheumatism?

Those containing acid and those which are especially likely to generate acid in the course of their metabolism, *e. g.*, the red meats and carbohydrates if used in excess.

What foods are restricted and what increased in the treatment of rickets? Why?

Carbohydrates are restricted; proteins, fats, and those containing a large portion of salt, as beef-juice, fruit-juices, and, if the child is old enough, green vegetables, and legumens, are increased. Rickets is usually due to a lack of protein, salts and fat in the diet. It occurs most frequently in young children whose diet has consisted largely of carbohydrates.

What foods are of special importance in the treatment of scurvy?

Those which contain potassium and iron salts and the fruit acids.

Infants are given orange-juice, beef-juice, and, unless nursed, properly modified milk. Older children and adults are given rare beef, fresh vegetables, especially potatoes, and fruits.

CHAPTER XVII

MATERIA MEDICA

Define Materia Medica and Therapeutics.

The former is the science that treats of the source, preparation, and properties of agents used as medicines. The latter, the science which treats of the application of medicines in the treatment of disease.

What are solutions?

Preparations of non-volatile substances dissolved in water.

What is a saturated solution?

One that contains as much of the drug as the water can dissolve.

What is the difference between solutions and tinctures?

The latter are prepared with alcohol instead of water.

What is the difference between a solution and a water?

In the former the principle is a non-volatile substance, in the latter, a volatile.

What is the difference between a tincture and a spirit?

The principle of the former is a non-volatile substance, that of the latter a volatile.

What is the difference between tinctures and fluid extracts?

Fluid extracts are stronger than tinctures and they have a definite strength; one c. c. always representing one gram of the drug.

Mention the more common percentage of tinctures.

Ten to twenty per cent.

What is the difference between a decoction and an infusion?

The former is made by boiling a drug in water; the latter, by steeping the drug in water without boiling.

What are mixtures?

Preparations in which an insoluble substance is held in suspension in water by means of some viscid substance.

What is an emulsion?

A preparation in which an oily substance is kept suspended in water by means of some viscid substance.

What is a syrup?

A preparation in which the drug is dissolved in a sugar solution.

What is an elixir?

A syrup containing alcohol.

What is an extract?

A solid preparation made by extracting a drug with a solvent and then evaporating the solvent.

Action of Drugs

What are alteratives?

Drugs that produce favorable changes in the processes of nutrition, and overcome morbid conditions.

What are anesthetics?

Drugs that produce insensibility, either local or general.

What are anodynes and analgesics?

Drugs that relieve pain. The former title is usually used for drugs that are applied externally for the

relief of local pain; the latter, for those given internally.

What are anthelmintics?

Drugs given to expel or kill worms infesting the intestines.

What are antiperiodics?

Drugs that prevent the periodic return of symptoms—as the chill in malaria.

What are antihydrotics and anhydrotics?

Medicines that diminish the secretion of sweat.

What are antipruritics?

Agents that relieve itching.

What are antipyretics?

Drugs that reduce fever.

What are antiseptics?

Drugs that prevent the development of bacteria.

What are antispasmodics?

Drugs which prevent muscular spasms.

What are aperients?

Mild cathartics.

What are astringents?

Drugs which contract tissue, and thus lessen secretions and discharges.

What are cardiac sedatives?

Drugs which lessen the rate of the heart's action.

What are cardiac stimulants?

Drugs that strengthen the power of the heart's action.

What are carminatives?

Drugs that aid in the expulsion of gas or flatus.

(a) *What are cathartics or purgatives; and (b) how are they divided?*

(a) Drugs which produce evacuation of the bowels.

(b) Drastic cathartics, those having a severe action;

hydragogues, those which cause watery evacuations; laxatives or aperients, those with a mild action.

What are cholagogues?

Drugs that stimulate the flow of bile.

What are diaphoretics?

Drugs that increase the excretion of sweat.

What are disinfectants?

Drugs that will kill bacteria.

What are diuretics?

Drugs that increase the excretion of urine.

What are emetics?

Agents which cause vomiting.

What are emmenagogues?

Drugs that stimulate the menstrual flow.

What are expectorants?

Drugs that increase the bronchial secretion.

What are galactogogues?

Drugs which stimulate the flow of milk.

What are hematinics?

Drugs which increase the hemoglobin of the blood.

(a) *What are hemostatics?* (b) *Styptics?*

(a) Drugs which will arrest hemorrhage. (b) Drugs applied locally to arrest local hemorrhage?

(a) *What are mydriatics?* (b) *Myotics?*

(a) Drugs which dilate the pupil. (b) Drugs that cause contraction of the pupil.

Define narcotics, hypnotics, and soporifics?

Narcotics are drugs which produce a deep sleep or stupor; hypnotics and soporifics, those which cause a more or less natural sleep.

What are stomachics?

Drugs which increase the secretory and motor power of the stomach.

What are tonics?

Drugs which improve the appetite or nutrition or both and give tone to the system.

What are teniacides?

Drugs which will destroy intestinal worms.

(a) *What are vasoconstrictors?* (b) *Vasodilators?*

(a) Drugs which cause constriction of the blood-vessels. (b) Drugs which dilate the blood-vessels.

What is the difference between the physiologic and therapeutic action of drugs?

The former is the action of the drug on the system, whether beneficial or the reverse. The latter is the curative action.

ACETANILID.—*What are the synonyms of acetanilid?*

Antifebrin, Phenylacetanilid.

Give the physiologic action of acetanilid.

It is antipyretic, analgesic, antiseptic, cardiac depressant, and hemostatic.

Mention an important thing to remember in regard to acetanilid.

That it is a cardiac depressant, and that patients, not confined to bed, should not be allowed to indulge in much exercise after taking it.

What are the symptoms of overdosing?

Slow, feeble pulse; slow respiration; cyanosis; sweating.

What is the treatment for poisoning?

Give emetic and lavage, keep the patient quiet, warm, and in the recumbent position; give stimulants if necessary.

What is the medicinal dose?

2 to 10 grains.

ACETIC ACID.—(a) *What is acetic acid, and* (b) *what is one of its chief medicinal purposes?*

- (a) A liquid obtained by the distillation of wood.
 (b) To check hemorrhage, especially that of the uterus.

ACONITE.—*Give the therapeutic action of aconite.*

It is analgesic, antipyretic, a respiratory sedative, cardiac sedative, vasodilator, and diuretic.

Mention the preparations and dosage.

Extract, dose, $\frac{1}{8}$ to $\frac{1}{2}$ grain. Fluid extract, dose, $\frac{1}{4}$ to 1 minim. Tincture, dose, 1 to 3 minims. The alkaloids, acontin—crystalline—dose, $\frac{1}{600}$ to $\frac{1}{200}$ grain, acontin—amorphous,—dose, $\frac{1}{40}$ to $\frac{1}{15}$ grain.

What are the signs of overdosing?

Tingling sensation in the skin, numbness of the extremities, slowing of the pulse.

What are the symptoms of poisoning?

Increased severity in symptoms of overdosing, accompanied by a condition of collapse and, frequently, convulsions.

What is the treatment for poisoning?

Lavage (emetics are not given as a rule, as they are likely to increase the depression of the heart), keep the patient warm and quiet, give the chemical antidote—*i. e.*, tannic acid—and stimulate.

ALCOHOL.—*Why is alcohol considered a food?*

It is oxidized in the body, and therefore supplies heat and energy and saves the tissues from oxidation.

How is it obtained? What is its action?

By fermentation and distillation of saccharine substances.

It is a nerve depressant and thus acts as an hypnotic and produces dilation of superficial blood-vessels. Taken internally and well diluted it tends to promote digestion and absorption, but, used immoderately, it causes harmful changes in tissues. It evaporates

readily and, used externally, reduces temperature. In solution of 50–70 %, it is a disinfectant.

How much water is contained in (a) absolute alcohol? (b) In common alcohol? (c) In dilute alcohol?

(a) 1%. (b) 9%. (c) 58.5%.

Give the average per cent. of alcohol in brandy and whiskey.

44–55%.

In red wines; as Claret, Bordeaux, and Port.

7% to 12%.

In white wines; as sherry and Madeira.

7% to 12%.

(a) *In champagne.* (b) *Beer.* (c) *Ale.*

(a) 5% to 15%. (b) 2% to 5%. (c) 4% to 7%.

What are the signs of overdosing?

The pulse becomes unnaturally strong, bounding and frequent; the mucous membranes dry; and the patient restless.

What are the symptoms of acute poisoning?

Increase of the symptoms of overdosing, vomiting, stupor, and coma.

What is the treatment for poisoning?

Evacuate the stomach by the use of emetics and lavage; apply external heat; stimulate with strong coffee (per rectum) and, if necessary, strychnine, aromatic spirits of ammonia, or digitalis.

AMMONIUM AND AMMONIUM COMPOUNDS.—*What is the therapeutic action of ammonia?*

It is cardiac, respiratory, and spinal stimulant and, externally, a rubefacient.

How is it often administered when a quick stimulation is necessary?

By inhalation.

What must be remembered when giving it in this manner?

That, unless given with caution, serious irritation of the respiratory tract may result.

What caution must be taken when taking it by mouth, and why?

To dilute it well; otherwise, it is very irritating to the mucous membrane of the digestive tract.

Name some of the important compounds of ammonia, give their dosage and action other than that of the ammonia.

Aromatic Spirits of Ammonia, dose $\frac{1}{2}$ to 2 drams. Ammonium Carbonate, dose 5 to 30 grains. Ammonium Chlorid, dose, 5 to 30 grains. All three are expectorants, the two last cholagogues.

AMYL NITRATE.—*What is the action of Amyl Nitrate?*

Vasodilator; antispasmodic.

State dosage and how drug is administered.

1 to 5 minims. By inhalation.

ANTIPYRIN.—*From what is antipyrin derived, and what is its action?*

Coal-tar. It is analgesic, antipyretic, styptic, and antiseptic.

Give dosage and symptoms following toxic doses.

5 to 15 grains. Sleepiness, slow respirations, slow, feeble pulse; cyanosis; profuse perspiration; vomiting; and collapse.

What is the treatment for poisoning?

Lavage; external heat; stimulants.

APOMORPHINE.—*What is the chief use of apomorphine?*

To produce emesis.

What is the dosage and how is the drug usually administered?

$\frac{1}{60}$ to $\frac{1}{8}$ of a grain. By hypodermic injection.

ARSENIC.—*State the action of arsenic.*

It is an alterative, nerve sedative, hematinic, gastro-intestinal irritant, and caustic.

Name two of the more important preparations, and give dosage.

Arsenous acid, gr. $\frac{1}{60}$ to $1\frac{1}{20}$, or in solution, 1 to 10 minims. Liquor Potassii Arsenitis (also called Solution of Potassium Arsenite and Fowler's solution), dose, 1 to 10 minims.

What drugs are incompatible?

Tannic acid, iron salts, magnesium.

Mention two things to remember when giving arsenic for any length of time.

To give it well diluted, and to watch for symptoms of overdosing.

What are the symptoms of overdosing?

Puffiness under the eyes in the morning, slight diarrhea, attacks of intestinal colic.

What are the symptoms of acute poisoning?

Purging, abdominal pain, nausea, vomiting, cold exterior, small, frequent pulse, collapse.

Describe the treatment for poisoning.

Give lavage; chemical antidote, which is freshly precipitated ferric hydrate with magnesia, or hydrated magnesia alone; raw eggs, milk. Apply external heat; stimulate if necessary.

ASA FETIDA.—*What are the two principal uses of asafetida?*

Carminative and nerve sedative.

How is it usually given for the former purpose?

As an enema.

What are the preparation and dosage?

Tincture, dose $\frac{1}{4}$ to 1 dram. Emulsion, dose 1 to 4 drams.

BALSAM OF PERU.—*For what is balsam of Peru chiefly used?*

As a stimulant to indolent ulcers and granulations.

BELLADONNA.—*What is the alkaloid of belladonna?*

Atropin.

Give the action of belladonna.

It is an analgesic, antispasmodic, cardiac, and respiratory stimulant, cerebral excitant, secretory depressor, mydriatic, and in small doses it is a vasoconstrictor; in large, a vasodilator.

For what purpose is it chiefly used as a secretory depressor, and how applied?

To check the secretion of milk. It is applied to the breasts in the form of ointment.

How is it sometimes given by inhalation for relief of asthma?

The leaves are set on fire and the smoke inhaled.

For what class of medicines is atropin used as a physiologic antidote in the treatment for poisoning?

Those which depress the respiration.

Mention the preparations for internal use, and dosage.

Extract, dose $\frac{1}{8}$ to $\frac{1}{2}$. Fluid extract, dose 1 to 2 minims. Atropin, dose gr. $\frac{1}{60}$ to $\frac{1}{120}$. Atropin sulphate, dose same as atropin.

What are the signs of overdosing?

Dryness of the mouth and throat, difficulty in swallowing, the skin is flushed and dry, and the pupils dilated.

What are the symptoms of poisoning?

Increase of the symptoms of overdosing followed by dizziness, and, sometimes, blindness, delirium, and coma.

What is the treatment for poisoning?

Lavage, treat for collapse, give tannic acid. Artificial respiration may be necessary.

CAFFEIN.—*State the action of caffein.*

It is a cardiac stimulant, a cerebral excitant, and a diuretic.

State dosage.

$\frac{1}{2}$ to 5 grains.

What are the signs of overdosing?

Headache, nervousness, insomnia, tremor.

What are the symptoms of poisoning?

Increase of symptoms of overdosing and profuse urination, colic, and collapse.

State treatment for poisoning.

Give emetics, lavage, tannic acid; apply external heat.

CAMPHOR.—*State the action of camphor.*

It is an antipruritic, a carminative, cardiac stimulant, diaphoretic, and nerve sedative.

CANNABIS INDICA.—*What are synonyms of cannabis indica?*

Indian hemp. Haschisch.

State its action.

It is a narcotic and sedative.

CANTHARIDES.—*For what is cantharides most commonly used? What ill effects may follow its use?*

As a vesicant. Irritation of the kidneys, extreme vesication.

CASCARA SAGRADA.—*What is the action of cascara sagrada?*

In small doses it is a stomachic and tonic; in large, a laxative or cathartic, according to the size of the dose. It acts as a tonic on the intestinal walls and thus stimulates their action, thereby producing more normal bowel movements than the majority of cathartics.

Mention preparations and doses?

Extract, dose, 1 to 6 grains. Fluid extract, dose, 15 to 60 minims. Cascarin, dose, $\frac{1}{4}$ to 1 grain.

CASTOR OIL.—*What is the synonym of castor oil?*

Oleum Ricini.

What is its action?

Cathartic, galactagogue.

Why is it much used in the treatment of diarrheas, and in obstetrical cases?

In the former instance because it is usually quick and thorough in its purgative action, and this is followed by a sedative effect on the intestinal walls. In the latter instance because of its galactagogue property; also, because it is eliminated in the milk, and thus acts as a cathartic for the nursing infant.

CERIUM OXALATE.—*Mention the principal use of and dosage of cerium oxalate.*

It is used chiefly as an antiemetic. The dose is 1 to 5 grains.

CHLORAL HYDRATE.—*State action of chloral hydrate.*

It is hypnotic, antispasmodic, and a cardiac depressant.

State (a) the dose, and (b) the symptoms of poisoning.

(a) 5 to 20 grains. (b) Profound sleep, which may gradually pass into coma; a slow, feeble, irregular pulse; slow, shallow respiration; cold skin; cyanosis.

Give treatment for poisoning.

Give lavage; coffee enemata; apply external heat. Artificial respiration is often necessary; mustard foot-baths are frequently given.

State dose of butyl chloral hydrate.

5 to 20 grains.

CHLORALAMID. CHLORALOSE.—*What is the action and dose of these drugs?*

They are hypnotics. The dose of the former is 15 to 40 grains; the latter, 3 to 10 grains.

CHLOROFORM.—*State action of chloroform.*

It is anesthetic, antiseptic, a stomachic, vesicant, and cardio-respiratory depressant.

Mention the preparations for internal use and state their dosage.

Chloroform water, dose, 1 to 8 drams. Spirit, dose, 15 to 60 minims. Emulsion, dose, 1 to 2 drams. (For chloroform as an anesthetic see page 360.)

CINCHONA.—*Mention action of cinchona.*

It is a stomachic and tonic.

Mention the principal preparations and their doses.

Fluid extract, dose, minims, 5 to 60. Tincture, dose, drams 1 to 2. Infusion, dose, ounces, 1.

What is quinine?

An alkaloid obtained from the powdered bark of cinchona.

State its action.

It is a stomachic, general tonic, antiperiodic, antipyretic, cerebral excitant, and, in some cases, it produces uterine contractions.

What is the dose of quinine sulphate?

1 to 5 grains when given as a tonic. 10 to 30 grains when given as an antipyretic.

Mention the symptoms of overdosing.

Ringing in the ears, deafness, headache.

COCAIN.—*What is cocain?*

An alkaloid of coca, a substance derived from the leaves of the Coca Erythroxylon.

What is its action?

It is anesthetic, a cerebro-spinal and cardiac stimulant, and a mydriatic.

Mention dose of hydrochlorate of cocain.

$\frac{1}{8}$ to 1 grain.

What are the symptoms of overdosing?

An excessive dose may be followed by hysterical symptoms, such as uncontrollable laughter and crying, and incoherent speech; cyanosis; a rapid, feeble, intermittent pulse, dryness of the mucous membranes; nausea, vomiting; and dilated pupils. Those who take cocain habitually become exceedingly emotional; while under the influence of the drug they are exhilarated, but as soon as the effect passes off they are depressed. They are nervous, troubled with insomnia, they become emaciated, and their digestion is completely disordered.

COD-LIVER OIL.—*What is the synonym of cod-liver oil?*

Oleum Morrhuæ.

What is its action?

It is an alterative and it improves nutrition; it is formed into fatty tissue and it is oxidized in the body, thus it is as much a food as a medicine.

Why is cod-liver oil more easily digested than other fats?

Because of the changes caused in it while in the liver of the fish.

How can it be made more palatable?

It can be given in capsules, or with lemon-juice, wine, wintergreen, etc., and it must be cold.

COLCHICUM.—*In what diseases is colchicum usually used?*

In gout and chronic rheumatism.

What is its physiologic action?

In small doses it is a gastro-intestinal stimulant, in large, an irritant. It also lessens the pain and pathological condition in the affected joints in gout and

chronic rheumatism, in some way that is as yet unaccounted for.

Give the preparations and dosage.

Extract of the root, dose, $\frac{1}{2}$ to 2 grains. Fluid extract of the root, dose, 2 to 8 minims. Fluid extract of the seed, dose, 3 to 10 minims. Tincture of the seeds, dose, 5 to 30 minims. Wine of the root, dose, 5 to 20 minims. Wine of the seeds, dose, 20 to 60 minims. Colchicin, dose, $\frac{1}{120}$ to $\frac{1}{30}$ grains.

COLOCYNTH.—*Give the action, preparations, and dosage of colocynth.*

It is a powerful hydragogue cathartic. Extract, dose, $\frac{1}{2}$ to 2 grains. Colocynthin, dose, $\frac{1}{8}$ to $\frac{1}{3}$ grain.

CONVALLARIA.—*What is the action of convallaria?*

It is a cardiac tonic, its effect on the heart being similar to digitalis; that is, it produces a slow powerful heart action. It is also a diuretic.

Give the preparations and dosage.

Fluid extract, dose, 5 to 20 minims. Convallarinum or Convallarin, dose, $\frac{1}{2}$ to 2 grains.

COPAIBA.—*What are the chief actions of copaiba?*

Expectorant and urinary stimulant.

Give principal preparations and dosage

Oil, dose, 5 to 10 minims. Resin, dose, 5 to 10 minims.

CREOSOTE.—*What is creosote?*

An oily liquid procured from beech-wood by distillation.

State its action and its principal purpose.

Externally, it is an anesthetic and parasiticide. Internally, an antiseptic and gastric irritant. It is used principally as an inhalant in the treatment of tuberculosis.

CROTON OIL.—*What is the synonym of croton oil?*

Oleum Tiglii.

What is its action?

Applied externally it is a rubefacient and vesicant. Internally it is a drastic cathartic.

What is the dosage, and how should it be administered?

$\frac{1}{4}$ to 2 minims. It should be mixed with other oil or butter, or it can be given on sugar.

How will you give a fractional part of a minim?

Mix 1 minim in a few minims of oil or melted butter and give a sufficient number of minims of the diluent to obtain the required fraction of the minim of croton oil.

Mention the symptoms of poisoning.

Nausea, vomiting, purging, intense abdominal pain, collapse.

What is the usual treatment for poisoning?

Lavage; demulcent drinks, as oils, flaxseed-tea, flour gruel, white of egg; external heat; stimulation.

DIGITALIS.—*What is the synonym of digitalis?*

Foxglove.

What are its chief constituents?

The glucosides digitalin, digitoxin, digitonin, and digitalein.

What substances are incompatible with it?

Acids, alkalies, tannin, cinchona, iron, and lead salts.

State action of digitalis.

It is a cardiac tonic, a vaso-constrictor, a diuretic, and a gastro-intestinal irritant.

Give preparations and dosage.

Extract, dose, $\frac{1}{4}$ to 1 grain. Fluid extract, dose, $\frac{1}{2}$ to 3 minims, tincture, dose, 5 to 30 minims. Infusion, dose, 1 to 4 drams. Digitalin, dose $\frac{1}{50}$ grain.

When giving digitalis for any length of time, what should a nurse do before giving each dose and why?

Count the pulse. Slowing of the pulse is one of the first symptoms of overdosing. Digitalis is not readily eliminated from the system, and, therefore, unless the symptoms of overdosing are recognized, even a small dose may cause poisoning.

What are the symptoms of poisoning?

The pulse is at first slow, irregular, and out of proportion to the heart-beat, later, it becomes rapid; there is nausea, vomiting, purging, intense headache and unless prevented, collapse.

What is the treatment for poisoning?

Lavage—an emetic is not given if the patient is prostrated—give the chemical antidote, *i. e.*, tannin; apply external heat; stimulate. It is most important to keep the patient in the recumbent position.

DIURETIN.—*What is diuretin, and what is its purpose and dosage?*

It is a combination of sodium salicylate and theobromine. It is a diuretic. Dose, 15 grains.

ERGOT.—*What is Ergot?*

A preparation procured from rye.

What are its principal constituents?

Ergotin and cornutin.

What is its action?

It is hemostatic, antihydrotic, and ecbotic.

Give the preparations and dosage.

Extract, dose, 5 to 15 grains. Fluid extract, dose, $\frac{1}{2}$ to 2 drams. Wine, dose, 1 to 4 drams. Ergotin, dose, 1 to 10 grains.

ETHER.—*What is ether?*

A liquid derived from the distillation of alcohol with sulphuric acid.

What is its action?

It is an anesthetic and a cardiac and respiratory stimulant.

(For use of ether as an anesthetic see page 360.)

Mention preparations of ether and dosage.

Spirits of Ether, dose 15 to 60 minims. Compound Spirits (Hoffman's Anodyne), dose, 5 to 60 minims.

EUCALYPTUS.—*State action of eucalyptus.*

It is an antiperiodic, antiseptic, and expectorant.

Give preparations and dosage.

Oil, dose, 5 to 10 minims. Fluid extract, dose $\frac{1}{4}$ to 1 dram. Eucalyptol, 5 to 10 minims.

EXALGIN.—*What is exalgin?*

An acetanilid derivative.

What is the dose?

1 to 4 grains.

GAULTHERIA.—*What are the synonyms of gaultheria?*

Oil of Wintergreen, Oil of Teaberry.

Mention preparations and dosage.

Dose of the oil, 5 to 20 minims. Spirit of Wintergreen, dose, 1 to 2 drams.

What is the physiologic action of wintergreen?

It is antiseptic, antihydrotic, antipyretic, anti-rheumatic, and a cardiac depressant.

GELSEMIUM.—*What is the synonym of gelsemium?*

Yellow Jasmine.

What is its physiologic action?

It is a mydriatic, a sedative, diaphoretic, motor depressant, and antispasmodic.

GENTIAN.—*What is the therapeutic action of gentian?*

It is stomachic.

What medicines are incompatible with it?

Iron and lead preparations.

Mention preparations and dosage.

Extract, dose, 1 to 10 grains. Fluid extract, dose, 5 to 30 minims. Compound tincture, dose, 1 to 4 drams.

GINGER.—*What is the synonym of ginger?*

Zingiber.

State its therapeutic action.

Externally, it is a counter-irritant; internally, a stomachic and carminative.

Mention preparations and dosage.

Fluid extract, dose, 5 to 15 minims. Tincture, dose, 10 to 60 minims. Oleoresin, dose, $\frac{1}{2}$ to 2 minims.

GLYCERIN.—*Of what is glycerin the product?*

The action of superheated steam or alkaline fluids on fats.

With what class of substances is glycerin classed chemically?

Alcohol.

State the therapeutic action of glycerin.

Externally it is an emollient; internally, a laxative.

GLYCYRRHIZA. *What are the synonyms of glycyrrhiza?*

Liquorice, Licorice.

For what is it chiefly used?

To obtain catharsis.

Give preparations and dosage.

Extract, dose, 5 to 60 grains. Fluid extract, dose, 1 to 2 drams. Compound powder—which consists of senna, licorice, sulphur, and oil of fennel—dose, 1 to 2 drams. Compound mixture also known as Brown's mixture—contains licorice, paregoric, wine of antimony, and spirit of nitrous ether, dose, 1 to 4 drams.

GUIACOL.—*What is Guiacol?*

One of the chief constituents of creosote.

State its principal therapeutic properties.

It is antiseptic and to a certain degree, a local anesthetic, it is also a local antipyretic.

For what purpose is it most commonly used?

It is applied externally for relief of pain in rheumatism, neuralgia, etc.

How is it generally applied?

It is mixed with equal parts of glycerin, painted over the prescribed surface and the area covered with non-absorbent cotton and bandaged.

Why is it covered?

To prevent the too rapid evaporation of the guaiacol.

What must be remembered when guaiacol is given internally?

That the patient should be carefully watched as even small doses of the drug will sometimes cause collapse.

HEROIN.—*What is heroin?*

A preparation formed by the action of acetic acid on morphine.

State preparations and dosage.

Heroin, dose, $\frac{1}{4}$ to $\frac{1}{8}$ grain. Heroin Hydrochlorate, dose, $\frac{1}{4}$ to $\frac{1}{8}$ grain.

What is its action?

Hypnotic.

HYDRASTIS.—*State the action of hydrastis.*

It is an astringent, a cholagogue, a cardio-respiratory stimulant and it accelerates delivery.

Mention preparations and dosage.

Fluid extract, dose, 5 to 60 minims. Tincture, dose, $\frac{1}{2}$ to 2 drams. Hydrastin, dose, $\frac{1}{4}$ to 1 grain. Hydrastinin Hydrochlorate, dose, $\frac{1}{4}$ to $\frac{1}{2}$ grain.

HYDROCHLORIC ACID.—*Mention synonyms of hydrochloric acid.*

Muriatic Acid. Hydrochloricum.

Give its physiologic action.

If taken after a meal it increases the acidity of the gastric juice and so aids in digestion. It increases the flow of saliva, but, if taken before or during a meal, it decreases the secretion of gastric juice. It is a hematinic, and caustic.

How should it be administered?

Well diluted and after meals. It should be taken through a glass tube to avoid its corrosive action on the teeth.

Mention preparations and dosage.

Dilute hydrochloric acid (which has a strength of 1 part acid to 4 of the diluent), dose, 10 to 30 minims. Nitro-hydrochloric acid, dose, 10 to 20 minims.

HYOSCYAMUS.—*What is the synonym of hyoscyamus?*
Henbane.

Name its alkaloids.

Hyoscin or scopolamin and hyoscyamin.

State its action.

It is an analgesic and hypnotic, it is a cardiac and respiratory stimulant, and, owing to the stimulating action which it has on the muscles of the intestine, a laxative. It reduces the pulse rate.

Name the preparations and dosage.

Tincture, dose, $\frac{1}{2}$ to 2 drams. Extract, dose, $\frac{1}{2}$ to 2 grains. Fluid extract, dose, 5 to 15 minims. Hyoscyamin Sulphate, dose, $\frac{1}{40}$ to 1 grain. Hyoscin Hydrobromate, dose, $\frac{1}{100}$ to $\frac{1}{50}$ grain.

ICHTHYOL.—*What is ichthyol?*

A substance procured by the distillation of the fossil remains of fish.

What is its synonym?

Ammonium Sulpho-ichthyolate.

How is it chiefly used?

Externally, in the treatment of indolent ulcers, skin diseases, etc.

What is its action?

It is slightly antiseptic, alterative, and it stimulates the growth of granulation tissue and epithelia.

IODIN.—*What is iodine?*

A substance derived from the ashes of sea-weeds.

What is its action?

It is a counter-irritant and antiseptic. Potassium Iodid, an important preparation, is a tonic, alterative, and diuretic.

Name some of the important preparations of iodine.

Tincture of Iodin. Potassium Iodid. Iodoform.

State common uses and strengths of tincture of iodine.

It is chiefly used externally as a counter-irritant and skin disinfectant. Strengths often used are 7% for counter-irritation and 2-3% for disinfection.

Mention dose of potassium iodid and how it is administered.

Dose, grains 5 to 60. Potassium iodid should be well diluted, it is often given in milk.

What name is given to the condition resulting from overdosing with potassium iodid, and what are the symptoms?

Iodism. Salivation, coryza, swelling of the eyelids, frontal headache, sore-throat, hoarseness, rise of temperature, general malaise.

How is iodoform obtained?

By heating iodine with potassium carbonate, alcohol, and water, and allowing the deposit to settle.

What are the first symptoms of the over-use of iodoform?

The urine becomes greenish in color and smells of iodoform, and rise of temperature. These may be the only symptoms, or there may be loss of appetite, headache, and the pulse may become rapid, irregular, and compressible.

Name one of the important derivatives of iodoform.

Aristol.

IPECAC.—*Mention (a) a synonym and (b) an alkaloid of ipecac.*

(a) Ipecacuanha. (b) Emetin.

State its therapeutic actions.

It is an emetic, expectorant, and diaphoretic.

Give principal preparations and dosage.

Fluid extract, dose, $\frac{1}{2}$ to 20 minims. Syrup, dose, $\frac{1}{2}$ to 2 drams. Wine, dose, 1 to 60 minims. Emetin, dose, $\frac{1}{2}$ to $\frac{1}{60}$ grain.

IRON.—*What is the normal proportion of iron to red-blood corpuscles in the body?*

1 part iron to 230 corpuscles.

What is one of its chief purposes in the body?

To take up oxygen from the inspired air and carry it to the tissue.

What substances are incompatible with iron?

Tannic acid, alkalies, salicylates, mercuric salts, albumin.

Give the physiologic action of iron.

Iron increases the quantity of red corpuscles and hemoglobin in the blood and thus acts as a general tonic; also, it is an astringent and hemostatic.

Give the primary symptoms of overdosing.

Acne of the face and chest, constipation, flatulence, frontal headache, and various digestive disturbances.

How should liquid preparations of iron be administered?

Well diluted and through a straw or glass tube.

JALAP.—*What is the action of jalap?*

It is a drastic purgative. It also, by its action on the bowels, lessens congestion and fluid accumulation in other parts of the body.

Mention preparations and dosage.

Extract, dose, 1 to 5 grains. Resin, dose, 1 to 5 grains.

MAGNESIA.—*From what is magnesia obtained?*

From dolomite—magnesian limestone.

What is the action of magnesia?

It is purgative, antacid, and diuretic.

Mention important preparations and dosage.

Magnesium Sulphate—Epsom Salts,—dose, 2 to 8 drams. Magnesium Carbonate, dose, $\frac{1}{2}$ to 2 drams. Solution of Magnesium Citrate, dose, 4 to 7 ounces. Effervescent Magnesium Citrate, dose, 1 to 4 drams.

MENTHA PIPERITA.—*What is the synonym of Mentha Piperita?*

Peppermint.

Name constituents.

Menthol and the volatile oil, piperita.

What is its action?

It is a local anesthetic and carminative.

Name the principal preparations for internal use and dosage.

Oil, dose, 1 to 5 minims. Spirits, dose, 5 to 15 minims. Water, dose, 1 to 8 drams.

MERCURY (*Hydrargyrum*).—*Mention substances incompatible with mercury.*

Alkalies, albumin, bromids, lime-water, tannin.

What is the action of mercury?

It is disinfectant, parasiticide, caustic, cathartic, cholagogue, hematinic, diuretic, alterative, anti-syphilitic.

How is corrosive sublimate (bichlorid of mercury) obtained?

By subliming bisulphate of mercury with chlorid of sodium.

How is calomel (hydrargyri chloridum mite) obtained?

By subliming sulphate of mercury with chlorid of sodium.

What is blue mass?

A purgative made by combining mercury in its metallic state with glycyrrhiza and althea.

What are the symptoms of overdosing by mercurial preparations?

Salivation, diarrhea, abdominal pain. In bad cases there are also looseness of the teeth, soreness and inflammation of the gums, emaciation, dyspepsia, fetor of the breath, and there may be some form of paralysis.

Mention symptoms of acute poisoning.

Excessive salivation, nausea, vomiting—the vomitus usually contains blood—diarrhea, suppression of urine, cold skin covered with perspiration, and collapse.

What is the treatment?

Give emetic, lavage, white of egg, milk, flour or starch paste, apply external heat, stimulate.

Mention some of the different ways in which the mercurials are used.

As a disinfectant, by scrubbing the object to be disinfected; by inunction; by fumigation (calomel); by mouth; hypodermatically; by baths.

NITROGLYCERIN.—*Mention synonyms of nitroglycerin.*

Glonoin, Trinitrin, Glyceryl Trinitrate.

How is it obtained?

By the action of nitric and sulphuric acids on glycerin.

In handling nitroglycerin, what precaution must be observed? Why?

It must never be held near fire, it is highly explosive.

What is its therapeutic action?

It is a vasodilator and antispasmodic.

What is the dose?

1 to 3 minims.

NUX VOMICA.—*What are the constituents of nux vomica?*

The alkaloids strychnin and brucin.

What is its physiologic action?

It is cardiac, respiratory, spinal, and cerebral stimulant, and a stomachic.

Mention preparations and dosage.

Extract, dose, $\frac{1}{8}$ to $\frac{1}{2}$ grain. Fluid extract, dose, 1 to 4 minims. Tincture, dose, 5 to 15 minims. Strychnin, dose, $\frac{1}{100}$ to $\frac{1}{30}$ grain. Strychnin nitrate, dose, $\frac{1}{100}$ to $\frac{1}{30}$ grain. Strychnin sulphate, dose, $\frac{1}{100}$ to $\frac{1}{20}$ grain.

What are the symptoms of overdosing?

Twitching of the muscles, restlessness, diarrhea, increase of reflex action.

What are the symptoms of poisoning?

Tonic convulsions; rapid, irregular pulse; the eyes are open and staring; there is acuteness of hearing; the mind usually remains clear.

What is the treatment?

Give emetic, lavage, the chemical antidote—tannin; quiet is of the utmost importance; inhalations of chloroform are given during treatment and to

quiet convulsions. Catheterize, to prevent reabsorption.

OPIMUM.—*Mention important constituents of opium.*

Morphine, codein, narcein, narcotin, and other less important alkaloids.

State physiologic action of opium.

It is analgesic, hypnotic, myotic, and a secretory depressant.

Name some of the principal preparations and dosage.

Extract, dose, $\frac{1}{8}$ to 1 grain. Powdered, dose, $\frac{1}{4}$ to 2 grains. Tincture (Laudanum), dose, 3 to 15 minims. Deodorized tincture, dose, 3 to 15 minims. Camphorated tincture (Paregoric), dose, 1 to 4 drams. Vinegar (Black Drop), dose, 3 to 15 minims. Dover's Powder (opium and ipecac), dose, 3 to 10 grains. Morphine, dose, $\frac{1}{8}$ to $\frac{1}{4}$ grain. Morphine Sulphate, dose, $\frac{1}{8}$ to $\frac{1}{4}$ grain. Morphine Hydrochlorate, dose, $\frac{1}{8}$ to $\frac{1}{4}$ grain. Codein, dose, $\frac{1}{4}$ to 1 grain. Codein Phosphate, dose $\frac{1}{4}$ to 1 grain. Codein Sulphate, dose, $\frac{1}{4}$ to 1 grain. Heroin (an artificial alkaloid), dose, $\frac{1}{24}$ to $\frac{1}{6}$ grain. An unofficial preparation, Magendie's Solution, average dosage, from 3 to 10 minims.

(a) *How much opium and how much ipecac is there in a 10 grain Dover's powder, and (b) what is the other constituent?*

(a) 1 grain opium, 1 grain ipecac. (b) Sugar of milk.

How much opium is there in an ounce of paregoric?
2 grains.

How much morphine in an ounce of Morphine Sulphate?

1 grain.

How much in an ounce of Magendie's Solution of Morphine?

16 grains.

State symptoms of overdosing by opium.

Contraction of the pupils, slowing of the respiration, drowsiness, free perspiration.

What are the symptoms of poisoning?

Slow respirations, contracted pupils, excessive drowsiness, cyanosis, pulse, at first slow, but, later, becoming rapid and weak.

State treatment and three important things to remember in the treatment. Give reasons.

Give emetic, and lavage, and either tannin or permanganate of potash; rectal injections of coffee; stimulate—atropin is generally given for this purpose as it stimulates the respiration as well as the heart. Keep the patient awake, give artificial respiration if necessary. (1) That lavage is to be given even when the drug is taken by hypodermic and (2) that it must be repeated frequently, for opium is eliminated through the stomach and intestines and, therefore, is continually passing from and into those organs. (3) That in order to keep the person awake, the stimuli used must be varied because, opium being an analgesic, even severe pain of any one kind soon ceases to be felt.

OX-GALL.—*What are the synonyms of ox-gall?*

Fel Bovis. Fel Tauri.

What is it?

The gall of the ox.

For what purpose is it used?

As a cholagogue and cathartic.

PANCREATIN.—*What is pancreatin?*

A ferment secured from the pancreas of the hog or ox.

What is its action?

When mixed with proteins, starches, or fats, it has the power to predigest them.

Why is it necessary to mix it with bicarbonate of soda?

It will only act in an alkaline medium.

PEPSIN.—*What is pepsin?*

A ferment obtained from the stomach of the pig or ox.

What is its action?

It will digest protein matter in an acid medium.

PHENACETIN.—*How is phenacetin obtained?*

By the action of glacial acetic acid on a coal-tar derivative.

What is its action?

It is antipyretic and analgesic.

What is the dose?

1 to 10 grains.

PHOSPHORUS.—*What is phosphorus?*

A non-metallic element obtained by treating bone-ash with sulphuric acid and water.

For what are phosphorus compounds commonly used?

As nerve tonics and to improve nutrition.

What are some of the important classes of phosphorus preparations?

Phosphates, glycerinophosphates, hypophosphates.

PILOCARPUS.—*State the therapeutic action of pilocarpus.*

It is diaphoretic, galactagogue, and myotic.

POTASSIUM COMPOUNDS.—*What is the chief use and dose of potassium acetate?*

It is chiefly used as a diuretic. Dose, 5 to 60 grains.

Of potassium bicarbonate?

Diuretic. Dose, 10 to 60 grains.

Of potassium bichromate?

It is used externally as an irritant; internally, as an expectorant. Dose, $\frac{1}{16}$ to $\frac{1}{6}$ grain.

What are the synonyms of potassium bitartrate?

Cream of Tartar, Acid Potassium Tartar, Tartar Crystals.

What is its chief purpose and dosage?

Cathartic. Dose, 20 grains to 1 ounce.

What is the action and dose of potassium bromide?

It is a nerve sedative, hypnotic, and antispasmodic. If taken in any quantity or for any length of time it is irritating to the stomach and may produce dyspepsia. Dose, 5 to 60 grains.

What is the use and dose of potassium chlorate?

It is used as a mouth wash, usually in a 4% solution.

Of potassium citrate?

A diuretic. Dose, 5 to 30 grains.

What is the synonym of potassium and sodium tartrate?

Rochelle salt.

State action and dose.

Cathartic. Dose, 1 dram to 1 ounce.

(a) What is the synonym of compound effervescing powder, and (b) what does it contain?

(a) Sedlitz powder. (b) 2 drams Rochelle salts, 40 grains sodium bicarbonate, 35 grains tartaric acid.

QUASSIA.—*What is the action of quassia?*

It is a stomachic and anthelmintic.

State preparations and doses.

Fluid extract, dose, 10 to 30 minims. Tincture, dose, 1 to 3 drams. Infusion, dose, 1 to 3 ounces.

(QUININ.—See CINCHONA.)

RESORCIN.—*What is resorcin?*

A coal-tar product.

What is its action and dosage.

It is antiseptic and antipyretic. Dose, 1 to 3 grains.

RHUBARB.—*What is the action of rhubarb?*

It is stomachic, astringent, and cathartic.

SALICYLIC ACID AND COMPOUNDS.—*From what source is salicylic acid derived?*

From carbolic acid, and from certain plants, such as wintergreen and sweet birch.

What is its therapeutic action?

It is antiseptic, anhydrotic, antipyretic, and anti-rheumatic.

(a) *In what parts of the body is it most frequently used as an anhydrotic, and (b) how is it applied?*

(a) The axilla and soles of the feet. (b) The powder is dusted over the skin.

What drugs are incompatible with it?

Spirit of nitrous ether, iron salts, and potassium iodid.

What is the dose?

5 to 30 grains.

Mention some of the salicylic acid compounds and derivatives and their dosage.

Aspirin, dose, 5 to 15 grains. Sodium salicylate, dose, 5 to 30 grains. Salol, dose, 1 to 10 grains. Salicin, dose, 5 to 30 grains. Salophen, dose, 5 to 15 grains.

SCOPARIUS.—*Name the principal constituent.*

Sparteïn.

What is its action?

Heart stimulant and diuretic.

Mention preparations and dosage.

Fluid extract, dose, 10 to 60 minims. Sparteïn sulphate, dose $\frac{1}{8}$ to $\frac{1}{2}$ grain.

(SCOPOLAMIN.—*See* HYOSCIN.)

SILVER SALTS.—*Mention some of the important preparations of silver salts.*

Actol, albargin, argenol, argentamin, argyrol, collargol, protargol, silver nitrate, and unguentum Crede which is a 15% ointment of collargol.

What is the principal therapeutic action of the silver salts?

Astringent and antiseptic. Silver nitrate is also a caustic.

In the treatment of what conditions is silver much used?

Those due to gonococcus infection.

SODIUM COMPOUNDS.—*What are the synonyms of sodium bicarbonate?*

Saleratus, baking-soda.

What is its action?

Given before meals, it increases the flow of gastric juice; given after meals, it neutralizes the acidity of the gastric juice. Used externally, it relieves skin irritation.

What is the use and dosage of sodium bromid?

It is a nervine and hypnotic. Dose, 10 to 60 grains.

What is sodium cacodylate?

The sodium salt of dimethyl arsenic.

What is its action and dosage?

Its action is the same as arsenic. Dose, $\frac{1}{2}$ to 2 grains.

What is the synonym of sodium sulphate?

Glauber's salt.

What is its action and dose?

Purgative. Dose, 1 to 8 drams.

STRAMONIUM.—*What is the chief action of stramonium?*

It is an antispasmodic.

Mention preparations and dosage.

Fluid extract, dose, 1 to 5 minims. Tincture, dose, 5 to 15 minims. It is also given by inhalation—the dried leaves are burned and the smoke inhaled.

STROPHANTHUS.—*What is the therapeutic action of strophanthus?*

Its action is similar to that of digitalis; *i. e.*, it is a heart tonic and circulatory stimulant and, being so, relieves edema and acts as a diuretic.

Mention preparations and dosage.

Tincture, dose, 2 to 10 minims. Strophanthin, dose, $\frac{1}{200}$ to $\frac{1}{100}$ grain.

SULFONAL.—*Mention action and dose of sulfonal. How is it usually given?*

Hypnotic. Dose, 10 to 30 grains. In hot milk.

SUPRARENAL SUBSTANCE.—*What is the action of the preparations made from the active principle of the suprarenal gland?*

It causes constriction of the blood-vessels, rise of blood pressure, and it stimulates the heart.

Mention preparations and dosage.

Dried gland, dose 3 to 8 grains. Extract, dose, $\frac{1}{4}$ to 1 grain. Adrenalin—1 to 1000 solution—dose, 5 to 15 minims.

TANNIC ACID.—*How is the officinal tannic acid derived?*

By washing powdered galls with ether.

What are galls?

Growths that occur in plants, due to the action of certain parasites.

State action of tannic acid.

It is astringent, anhydrotic, and hemostatic. It also, when combined with many of the medicinal

preparations, changes their nature into non-poisonous compounds.

When using tannic acid as a chemical antidote, what must be remembered regarding the nature of the compounds formed?

That they are capable of being dissolved unless removed from the stomach by lavage or the action of emetics.

Mention a substance that contains tannin which is generally readily obtained in emergency.

Tea.

TRIONAL.—*State action and dose of trional.*

It is hypnotic. Dose, 10 to 30 grains.

TURPENTINE.—*What is the synonym of turpentine?*

Terebinthine.

Name preparations used medicinally.

Oil of turpentine, and for external use, liniment.

(a) What is the dose of oil of turpentine, and (b) how is it best given?

(a) 5 to 30 minims. (b) It is best given in capsules or on sugar.

State physiologic action of turpentine.

Externally, it is used as a counter-irritant. Internally it is anthelmintic, antiseptic, carminative, diuretic, and expectorant.

URETHAN.—*(a) What is urethan, and (b) what is its action, and (c) its dosage?*

(a) A combination of carbonic acid and ethylic ether. (b) It is hypnotic. (c) Dose, 10 to 40 grains.

UROTROPIN.—*(a) What is the action and (b) dosage of urotropin?*

(a) It is a urinary antiseptic. (b) 5 to 7 grains.

VALERIAN.—*State therapeutic action of valerian.*

It is a gastric stimulant and nerve sedative.

VERONAL.—*What is the action of veronal?*
Hypnotic.

Reasons for the Various Actions of Drugs

Through what system of the body do the majority of drugs attain their effect.

The nervous system.

Mention some classes of drugs that produce their results by depressing some part of the nervous system.

General anesthetics, analgesics, antipyretics, hypnotics and nerve sedatives or antihysterics.

ANESTHETICS.—*How are anesthetics classified?*

As general—those which produce unconsciousness—and local—those which lessen sensation in the part to which they are applied.

Mention bad effects, due to the anesthetic, that sometimes occur during or following the giving of general anesthetics.

Asphyxia, heart failure, gastric or intestinal paralysis, pneumonia, nephritis.

What is the usual cause of asphyxia?

Loss of tone in the muscles of the tongue, larynx, and trachea as the result of depression of the nervous system—in consequence of which the tongue sometimes falls back over the trachea or vomitus enters it.

Mention some cause of heart failure and means that should be taken to prevent it.

Depression of nerve centers controlling the heart action; loss of muscle tone. Keep the patient warm and as quiet and free from excitement as possible.

To what may pneumonia and nephritis be due?

To (1) irritation of the respiratory tract and kidneys by the anesthetic; (2) chilling of the body; (3)

the body's natural resistance to these and other diseases is much lowered, on account of the hindrance that exists to proper metabolism until the anesthetic is eliminated from the system.

Why is chilling of the body particularly likely to occur?

Because for some time following the taking of an anesthetic there is profuse perspiration and any exposure will, by increasing the rate of evaporation, cause chilling of the body surface. Such action is always followed by some degree of congestion in internal organs, and after anesthesia, the kidneys and lungs, on account of their irritated condition, are very likely to be the ones affected. The chilling of the body surface occurs all the more readily on account of the loss of heat by radiation that follows exposure of the body or lowering the surrounding temperature. The reason for this is that, due to depression of the vasoconstrictors, the superficial blood-vessels are much dilated and, sometimes, there is a large amount of blood near the surface of the body.

Mention causes of defective metabolism.

Lack of muscle tone and destruction, by the anesthetic, of the ferments necessary for the process of oxidation in the tissues.

How is it that the kidneys are irritated by the anesthetics?

Anesthetics are eliminated through these organs.

To what properties do such local anesthetics as ether and ethyl hydrate owe their action and what care must be taken in their use?

To the rapidity with which they evaporate (heat is required for evaporation and it is taken from the

part to which the anesthetic is applied). Too much anesthetic must not be used or the part will be frozen and sloughing of the tissues follow.

ANTIPYRETICS.—*What class of drugs are listed as antipyretics?*

Those whose most pronounced action is the reduction of fever.

Mention one theory regarding the way in which the balance between the formation of heat in the body and its output is controlled.

It is thought that there may be a nerve center in the brain which, being affected by the temperature of the blood passing through it, acts upon certain nerve centers, especially those concerned in the dissipation of heat, *i. e.*, the vasomotor centers and those controlling the sweat glands.

To what do those who hold this theory attribute fever?

To depression of this heat-regulating center in consequence of which it does not become active until the blood has reached a temperature above normal.

How are the antipyretics thought to regulate this? What is their effect upon a normal temperature?

It is thought that they stimulate the heat-regulating center so that it will respond to a lower temperature. Unless large doses are used, antipyretics do not usually have much effect upon a normal temperature.

Mention objections to the use of these drugs.

Nearly all antipyretics (*e. g.*, acetanilid, antikamnia, antipyrin, phenacetin) cause hemolysis and, by their action on nerve centers, they depress the heart.

Why do hypnotics produce sleep?

They depress the cells of the cerebral cortex.

What care must be taken when treating patients for poisoning by nerve depressants?

The danger of collapse must be remembered and exertion and excitement be avoided. Opium is an exception to this rule, the heart is not so much depressed by this drug and strenuous measures can and must be used.

CENTRAL NERVOUS STIMULANTS.—*To what action do such drugs as caffein, strychnin, atropin, and cocain owe their effects?*

To stimulation of some part of the central nervous system.

What, consequently, will be a pronounced symptom in poisoning by these drugs and what care will be necessary in the treatment for poisoning? Why?

Convulsions. It will be necessary to keep the patient quiet and in quiet surroundings, for, due to the over-stimulated condition of the nerves, the slightest noise, touch, or light may act as a stimulus and provoke convulsions.

EMETICS.—*How are emetics classified?*

As local or gastric emetics—those which cause vomiting by their action on nerve-endings in the stomach, as do mustard and sodium chlorid—and as direct or systemic emetics—those which act directly upon the vomiting center in the medulla, as do apomorphin, and ipecacuanha.

BITTERS.—*How do bitters aid digestion?*

They stimulate nerve endings in the mucous membrane of the mouth and stomach and thereby increase the activity of the salivary and gastric glands. They do so because the stimulus is transmitted to centers in the medulla from which fibers pass to vasomotor and secretory nerves in the glands.

CATHARTICS.—*How do cathartics act?*

Either by a local irritation of nerve endings in the intestine which increases peristalsis or, as do the hydragogue cathartics, by increasing osmosis of liquid from the tissues into the lumen of the intestine and thereby liquefying its contents.

APPENDICES

APPENDIX TO CHAPTER I. CARE OF THE WARD

Mention some of the different processes involved in cleaning.

Absorption, chemical action, extraction, mechanical action, solvent action.

Mention some substances that can be used to absorb staining matter. Give examples of their use.

Paper, especially shredded blotting paper, talcum, starch, flour. If as soon as a staining agent, such as ink, is spilled, any of these substances are put into it, they will absorb much of the liquid. Also, they may be of use after the staining agent has dried if the latter is moistened with some liquid that will promote chemical action.

What do you understand by chemical action in connection with cleansing? Give examples of such action and the substances used to promote it.

The union of a chemical with dirt or a staining agent and its consequent disintegration; *e. g.*, (1) an alkali, such as potash, soda, or ammonia will decompose fats into their constituent parts—fatty acids and glycerin—and unite with the fatty acids to form soaps. (2) Certain chemicals, notably chlorine, have a great affinity for hydrogen and will, if put into hot water, decompose it by combining with the hydrogen. The oxygen thus set free thereupon unites with the coloring substances of the fabric, with dirt or staining agents and, by oxidizing them, decomposes them.

Such substances act as bleaching agents as well as cleansing agents. (3) Oxygen can be also sometimes obtained for these purposes by the use of substances, such as peroxid of hydrogen and permanganate of potash, which hold oxygen in such loose combination that it is easily set free when it comes in contact with substances for which it has an affinity. (4) Certain substances such as hydrocarbons, aldehyds and hydrogen have such a strong affinity for oxygen that they will extract it from compounds. Hydrocarbons, such as kerosene, are therefore used to remove rust from metals, rust being due to the union of oxygen with the metal. (5) Acids and alkalies unite to form a salt that is easily removed, consequently acids are used to remove stains made with alkaline substances and alkalies to remove those made with acids.

Give an example of extraction and state its value.

Cleaning with a vacuum apparatus. The dust is sucked into the pipes or reservoir provided for the purpose and can thus be easily removed without being scattered.

Mention some substances that owe their cleansing properties chiefly to mechanical action and state an objection to their use.

Sapolio, sand, and bon ami owe their cleansing properties chiefly to the friction they produce when rubbed upon a surface. The objection to the use of such things, especially the two mentioned first, is that they by friction, remove polish, paint enamel, and the like.

What do you understand by solvent action?

The power of dissolving substances.

Name (1) the solvent in most common use. (2) solvents used for fats, varnishes, and paints.

(1) Water. (2) Ether, benzene, turpentine, chloroform, and hot alcohol.

(1) *How is soap made?* (2) *Describe the chemical process that takes place in its making.*

One, or a mixture, of the common animal or vegetable fats, as tallow, suet, lard, olive oil, cotton-seed oil, cocoanut oil, is boiled with either sodium hydroxid (caustic soda) or potassium hydroxid (caustic potash or lye). If the former alkali is used a hard soap results, if the latter, a soft soap. The fat is split into its constituent parts—fatty acids and glycerin—and the acid unites with the fatty acid forming soap.

Upon what does the cleansing property of soap depend?

(1) Upon the alkali which, when soap is decomposed in the water, becomes freed from the acid and unites with any greasy substance that may be present in the soiling agent while (2) the other constituents of the soap, with the help of the water and friction, remove the dirt and dust mechanically.

What is meant by (1) temporary hard water (2) permanent hard water? Why is water so called? How can it be softened?

Temporary hard water is that containing acid carbonates of, usually, calcium or magnesium. Hardness due to this cause is said to be *temporary* because, when the water is boiled, the acid carbonates lose CO_2 and are thus changed to insoluble carbonates which are precipitated on the sides and bottom of the kettle. The hardness can be overcome also by the addition of soda carbonate, borax or ammonia to the water. Permanent hardness is that due to the presence of sulphates or chlorids of calcium or magnesium. Hardness due to this cause is said to be *permanent*

because it cannot be rectified by boiling the water. The water can be softened, however, by the addition of sodium carbonate to the water. This will cause a chemical action to take place in which an insoluble calcium carbonate and a soluble sodium sulphate will be formed. The insoluble carbonate will be precipitated, the soluble sodium sulphate will remain in the water, but, under ordinary circumstances, the presence of sodium sulphate is not objectionable.

Mention some of the disadvantages of hard water for cleansing and cooking?

(1) Hard water causes a great waste of soap, since, when the latter is added to hard water, it unites with the lime or magnesium, forming an insoluble curd which has no cleansing property. No lather will form, nor soap be of use, until all the alkali in the water has combined with the soap. (2) The curd thus produced occasions a deposit in sinks, pipes, and utensils. (3) When hard water is used for cooking, the salts are deposited upon the meat, vegetables, tea leaves, etc., and harden their tissues and prevent the drawing out of extractives. (4) The fur which collects upon the inner surface of kettles, boilers, sterilizers, etc., when water containing carbonates is boiled in them is a very poor conductor of heat, consequently, if it is not removed, there will be a great waste of fuel when using them, also the latter are likely to be damaged by overheating, the heat not being properly conducted away from the metal and, in the case of boilers or tightly closed vessels, there will be an explosion if the coating cracks suddenly and the water thus comes in contact with the intensely heated metal.

What will remove stains made by the curd deposited in sinks, baths, etc., when hard water and soap are used?

Kerosene and naphtha.

How should washing soda be prepared for use in the laundry?

It should be dissolved in the water before the clothes are put in. The solid soda must not be allowed to come in contact with the clothes.

How much soda should be used?

The amount will depend upon the degree of hardness of the water. Just enough soda should be used to make it possible to have the soap lather easily and not form a deposit. A grain of soda precipitates about $1\frac{1}{2}$ grains of calcium and magnesium sulphate and the amount of soda often needed is about 3 grains to a gallon of water, a very common average amount of sulphates in water being about 5 grains to the gallon.

What precautions must be observed when cleaning with soda and such soda compounds as Dutch cleanser and gold dust?

The soda or powder must not be used in excess and it must be thoroughly removed with water.

Describe the chemical reaction that takes place when lemon juice, salt, and water are used to remove stains.

The acid unites with the soda of the salt setting free the chlorin, the latter unites with the hydrogen of the water, liberating the oxygen which decomposes the staining substance.

Why are fabrics often placed in the sunlight when being treated for the removal of stains and when necessary to bleach them?

The heat and the chemical rays of the sun (*i. e.*, those which cause chemical reactions) hasten many chemical changes that do not occur readily and, due to its chemical rays, sunlight is a good bleaching agent.

APPENDIX TO CHAPTER IV — TEMPERATURE, AND CHAPTERS XV AND XVI—METABOLISM

What is meant by oxidation?

The union of oxygen with a compound and the consequent disintegration of the compound into its component parts and the liberation of heat.

Give examples of oxidation that occur outside the body and of agents that further the processes.

(1) Burning or combustion due, usually, to heat; (2) fermentation, due to ferments secreted by yeast or certain bacteria; (3) putrefaction, due to bacteria.

What are thought to be the principal agents in furthering oxidation within the body?

Enzymes, called oxidases, that are formed in the tissues and certain internal secretions, especially that of the pancreas.

What is the purpose of oxidation in the body?

The providing of heat and energy.

What is meant by energy?

The power to do work.

Give examples of work done by the body for which energy is required.

Respiration, the heart action, the circulation of the blood, and lymph digestion, maintaining of muscle tone, and all kinds of external work; *i. e.*, that performed by the skeletal muscles as in walking, talking, handwork, etc.

What prevents the heat thus formed accumulating in the body?

It is being constantly eliminated, principally through the skin by radiation and evaporation.

Mention some causes for variations in heat production and elimination and state how they act.

External cold will, by its action on the vasoconstrictor nerve centers, cause contraction of the superficial blood-vessels and, driving the blood to the interior of the body, prevent loss of heat by radiation. Warmth, on the other hand, induces dilation of the superficial blood-vessels and, consequently, the flow of blood to the skin and an increase in the loss of heat by radiation. Cold lessens and heat increases the amount of perspiration and, consequently, the amount of heat by evaporation. Muscular contraction, whether due to exercise, shivering, or other cause, increases the amount of oxidation in the body and thus the amount of heat produced.

If external heat increases the loss of heat from the body, why does heat prostration occur and why does humidity increase the danger?

Radiation from any hot body is impeded when the surrounding atmosphere is as warm as the body (the colder the surrounding medium, the greater the degree of radiation). When there is much moisture in the atmosphere, evaporation does not take place readily; therefore, in hot, humid weather, loss of heat from the body is interfered with and the body temperature rises.

APPENDIX TO CHAPTER V—BATHS

What is meant by reaction?

Action in an opposite or contrary direction to that in which an advance has already been made.

What is the primary effect (i. e., before reaction occurs) of cold applications upon the body?

Contraction of the small blood-vessels and consequent driving of the blood to the large internal vessels;

increased muscular contraction and consequently a slight rise of body temperature; pallor and a goose-flesh appearance of the skin; a sensation of chilliness and perhaps shivering, increase in the number of corpuscles in the blood, due to contraction of the liver, spleen, and other viscera; first quickening and then slowing of the pulse; first checked and then quickened and often gasping respiration; checking of the excretion of sweat.

Describe the nature of the reaction that must follow if the results wanted in the therapeutic use of cold are to be obtained?

The small superficial blood-vessels dilate and the large internal ones contract, so that an increased amount of blood comes to the surface of the body, thus the skin is warmed, but the body temperature is lowered, because the greater quantity of blood at the surface favors loss of heat by radiation; the pulse becomes slower and the respiration grows slower, freer, and deeper.

Mention procedures in the giving of a cold bath that will favor reaction.

Giving friction before, during, and after the bath; a hot bath before the cold; the application of warm clothing and giving a hot drink after the bath; sudden application of the cold, because, the more sudden the application, the greater the strength of nerve stimulation.

Mention physical condition, that retard reaction and call for greater care in the giving of baths.

Lowered vitality as in old age, anemia or long protracted illness; infancy; obesity—on account of the relative anemia of the skin;—rheumatism—on account of the weakening influence of the excess uric

acid on the system; a low temperature of the body or skin; nervous prostration—this interferes with reaction because of the abnormal condition of nerve centers upon which prompt reaction depends;—aversion to cold applications.

What is the effect of a bath just below body temperature?

If the skin is cold, it is warmed and the circulation in it improved; nervous irritability is lessened because the body is surrounded by a non-irritating medium and irritation of the cutaneous nerves, such as is present at other times, due to clothing, movements, changes in the temperature of the air, etc., ceases. Consequently, sleep may be induced and the nerve centers are afforded opportunity to accumulate a store of nutritive material and energy.

What will be the effect upon the system of a bath with a temperature higher than the body?

There will be muscular relaxation; expansion and softening of fibrous tissue; increased perspiration and consequent elimination of such waste matter as can be excreted through the skin; relief of congestion of the viscera due to dilation of the superficial blood-vessels; there will be a rise of temperature due to the prevention of loss of heat by radiation, and the evaporation of sweat, but, if the bath is not too long continued, it will be followed by reduction of temperature as the result of increased radiation on account of the large amount of blood in the skin and the evaporation of the excess sweat.

What dangers attend the use of hot baths?

The dangers of (1) scalds (2) of a chill, by exposure of the body to cold and a consequent too rapid reduction of temperature; (3) of syncope, due to interference

with the circulation on account of the relaxed condition of the large blood-vessels.

Mention some important things to remember when giving local hot-air baths.

(1) That the patient must be comfortable, therefore the height of the apparatus must be so arranged 'hat there will be no strain on the muscles of the part being baked and the patient will be able to lean back in his chair at ease. The part being baked must be protected with two or three layers of soft, thick, but light covering. (3) As metal becomes intensely hot in the high temperature often required (250° F. to 300° F.) nothing metal should come in contact with either the part being baked or the protectors; therefore, pins must never be put in the protectors and rings should be removed from the fingers. If necessary to have the part supported by a splint while it is being baked, a wooden one, never a metal, should be used and a thick layer of wool or absorbent cotton must be placed between it and the flesh.

Why has electric light often an advantage over other means for heating baths?

(1) The heat and the chemical rays from the light penetrate the tissues and act as a stimulus to the vital processes in the part exposed to their influence. (2) When desired, by leaving the door of the apparatus open, the air surrounding the patient can be prevented from becoming so hot that elimination of heat from the body will be interfered with.

What is meant by heat, light, and chemical rays?

A body when sufficiently hot causes vibrations in the surrounding ether (*i. e.*, the invisible medium that permeates all space) which results in waves of different lengths. According to their length, these waves have

different properties, thus, those of certain length cause heat, other shorter ones affect the optic nerve and are called light waves or rays; still shorter waves are named chemical rays. It is the chemical rays of the sun that are the principal cause of many of the chemical reactions occurring in nature which are necessary for the life and growth of plants and thus of man.

APPENDIX TO CHAPTER XV—GLAND SECRETIONS.
CLOTTING OF BLOOD. ENZYMES. ZYMOGENS.
KINASES

What is a secretory gland?

An organ which takes special substances from the blood, and, in many instances, changes them into matter of a different nature.

Mention an important difference in the structure of glands which furnish external and internal secretions.

Those which manufacture external secretions have ducts through which the secretions reach the exterior of the body or membrane or the interior of the cavity in which they are contained. Those glands which secrete internal secretions have no ducts, but their secretions are absorbed by the blood or lymph and are carried by the former to the parts of the body where they are required.

Name the ductless glands and other organs which furnish internal secretions.

The glands which have no ducts are the thyroid, parathyroids, thymus, suprarenal capsules or adrenal bodies, the pituitary body of hypophysis, the carotids and the coccygeal. The pancreas furnishes an internal, as well as an external secretion, the ovaries and

kidneys secrete an internal secretion and the glycogen formed by the liver is often called an internal secretion.

Where and what is the thyroid and what is the purpose of its secretion?

Two small masses of glandular tissue, situated one on either side of the trachea just below the thyroid cartilage. Little is known of the specific action of its secretion, but, if the gland is destroyed or fails to secrete, the condition known as *myxedema* results, and if there is overabundant secretion the condition called *exophthalmic* goiter occurs.

What and where are the parathyroid glands and what is their function?

Small masses of glandular tissue situated, as a rule, on either side of, or behind, the thyroid. Their function seems to be to destroy toxic matter formed elsewhere in the body.

What and where is the thymus gland and what is its function?

A two-lobed elongated glandular body situated below the thyroid. It, gradually, becomes smaller during childhood and disappears about the time of puberty. The function of the gland is unknown, but it is thought to have some connection with the development of the sexual organs.

What and where are the suprarenal capsules and what are their function?

Two small glandular masses which rest one upon each kidney. They produce a secretion which seems to be necessary for the maintenance of the tone of the heart and blood-vessels.

What and where is the pituitary body and what is its function?

A small, reddish-brown colored glandular body

situated in a depression in the central portion of the sphenoid bone. It is thought that the secretion it produces helps regulate blood pressure and metabolism. Over development of the gland seems to result in excessive size of the body and lack of development in dwarfing of the body.

What is the function of the carotids and coccygeal glands?

These are very small glands and their function is not known.

What is the function of the internal secretion of the pancreas?

It is necessary for the oxidation of glucose in the tissues. Diseases of the pancreas which interfere with its power to secrete the internal secretion result in diabetes mellitus.

What is thought to be the purpose of the internal secretion of the ovaries?

It is thought that it is responsible for menstruation and that it is concerned in some way in metabolism, since there is a tendency to grow stout as soon as the ovaries begin to hypertrophy at the time of the menopause.

Mention conditions that promote the clotting of blood?

Injury to the walls of a blood-vessel. Contact with foreign substance (thus gauze put into a wound or air, etc., entering a blood-vessel will cause clotting); contact with a rough surface; heat—about 116° to 120° F.; rest.

Why does blood not often clot within the living blood-vessels?

The reason is unknown but two common theories are: (1) that in the living blood-vessels, the leucocytes and blood-platelets do not disintegrate in sufficient

numbers to allow of thrombin being formed. (2) That thrombin is formed in the circulating blood, but that it is destroyed, either in the liver or else in the blood-vessels by an anti-thrombin substance formed in the walls of the vessels.

What name is given to a clot that does form in the living blood-vessels?

A thrombus.

Mention two causes for the formation of a thrombus.

Entrance of a foreign substance, as air, into a blood-vessel. Injury to a blood-vessel as by disease, injury, or a ligature.

What name is given to a clot that moves from its primary position?

An embolus.

What danger attends embolism—the passage of the embolus in the blood stream?

Sudden death, if the embolus becomes lodged in a large vessel.

For clotting of blood see page 238. For thrombosis and embolism see page 154.

What are enzymes?

Soluble ferments secreted by cells, both animal and vegetable.

Give examples of enzymes and their uses.

The ptyalin of the saliva, the pepsin of the gastric juice and the other ferments of the digestive juices which control digestion, and the oxidases and other enzymes in the body tissues that are at least partly responsible for the changes that occur in metabolism.

What are zymogens? Give an example.

Inactive enzymes. The trypsinogen secreted by the pancreas does not become active until certain changes are made in it in the intestine when it comes

in contact with the enterokinase of the intestinal juice. Were this not the case, the trypsinogen, being undiluted by food in the pancreas, might digest the gland.

What is a kinase? Give an example

A substance that activates pro-enzymes, *i. e.*, zymogens. The enterokinase of the intestinal juice which changes the trypsinogen of the pancreatic juice to trypsin.

What is a hormone? Give an example

A chemic substance produced in an organ which, when absorbed by the blood and carried to another organ or organs, produces functional activity. *E. g.*, the secretin formed in the mucosa of the intestinal wall, which, when absorbed by the blood and carried to the pancreas, liver, and, it is thought probable, the glands of the intestine, activate those organs.

COMPARISON OF CENTIGRADE AND FAHRENHEIT THERMOMETRIC SCALES

CENT. FAHR.	CENT. FAHR.	CENT. FAHR.	CENT. FAHR.
100 = 212	62.2 = 144	25.6 = 78	11.1 = 12
98.9 = 210	61.1 = 142	24.4 = 76	12.2 = 10
97.8 = 208	60 = 140	23.3 = 74	13.3 = 8
96.7 = 206	58.9 = 138	22.2 = 72	14.4 = 6
95.6 = 204	57.8 = 136	21.1 = 70	15.6 = 4
94.4 = 202	56.7 = 134	20 = 68	16.7 = 2
93.3 = 200	55.6 = 132	18.9 = 66	17.8 = 0
92.2 = 198	54.4 = 130	17.8 = 64	18.9 = 2
91.1 = 196	53.3 = 128	16.7 = 62	20 = 4
90 = 194	52.2 = 126	15.6 = 60	21.1 = 6
88.9 = 192	51.1 = 124	14.4 = 58	22.2 = 8
87.8 = 190	50 = 122	13.3 = 56	23.3 = 10
86.7 = 188	48.9 = 120	12.2 = 54	24.4 = 12
85.6 = 186	47.8 = 118	11.1 = 52	25.6 = 14
84.4 = 184	46.7 = 116	10 = 50	26.7 = 16
83.3 = 182	45.6 = 114	8.9 = 48	27.8 = 18
82.2 = 180	44.4 = 112	7.8 = 46	28.9 = 20
81.1 = 178	43.3 = 110	6.7 = 44	30 = 22
80 = 176	42.2 = 108	5.6 = 42	31.1 = 24
78.9 = 174	41.1 = 106	4.4 = 40	32.2 = 26
77.8 = 172	40 = 104	3.3 = 38	33.3 = 28
76.7 = 170	38.9 = 102	2.2 = 36	34.4 = 30
75.6 = 168	37.8 = 100	1.1 = 34	35.6 = 32

COMPARISON OF CENTIGRADE AND FAHRENHEIT THERMOMETRIC SCALES.—*Continued*

CENT. FAHR.	CENT. FAHR.	CENT. FAHR.	CENT. FAHR.
74.4 = 166	36.7 = 98	0 = 32	36.7 = 34
73.3 = 164	35.6 = 96	1.1 = 30	37.8 = 36
72.2 = 162	34.4 = 94	2.2 = 28	38.9 = 38
71.1 = 160	33.3 = 92	3.3 = 26	40 = 40
70 = 158	32.2 = 90	4.4 = 24	41.1 = 42
68.9 = 156	31.1 = 88	5.6 = 22	42.2 = 44
67.8 = 154	30 = 86	6.7 = 20	43.3 = 46
66.7 = 152	28.9 = 84	7.8 = 18	44.4 = 48
65.6 = 150	27.8 = 82	8.9 = 16	45.6 = 50
64.4 = 148	26.7 = 80	10 = 14	46.7 = 52
63.3 = 146			47.8 = 54
			48.9 = 56

METHOD OF CONVERTING ONE SCALE INTO ANOTHER

1. To change a Fahrenheit reading into centigrade: Subtract 32 from the given degree (the freezing point in the Fahrenheit scale being this much higher than in the centigrade scale), multiply the remainder by 5, and divide the result by 9. Thus:

$$212^{\circ} \text{ F.} - 32 = 180 \times 5 = 900 \div 9 = 100^{\circ} \text{ C.}$$

2. To change a centigrade reading into Fahrenheit: Multiply the given degree by 9, divide the result by 5, and add 32 to the remainder. Thus:

$$100^{\circ} \text{ C.} \times 9 = 900 \div 5 = 180 + 32 = 212^{\circ} \text{ F.}$$

TABLES OF WEIGHTS AND MEASURES

APOTHECARIES' WEIGHT

<i>Troy grains</i>	<i>Scruples</i>	<i>Drams</i>	<i>Troy ounces</i>	<i>Pound</i>
gr. 20 =	℥ 1			
60 =	3 =	3 1		
480 =	24 =	8 =	℥ 1	
5760 =	288 =	96 =	12 =	lb. 1

A VOIR DUPOIS WEIGHT

<i>Troy grains</i>		<i>Drams</i>		<i>Ounces</i>		<i>Pound</i>
gr. 27.34375	=	dr. 1				
437.5	=	16	=	oz. 1		
7000	=	256	=	16	=	lb. 1

TROY WEIGHT

<i>Grains</i>		<i>Pennyweights</i>		<i>Ounces</i>		<i>Pound</i>
24	=	dwt. 1				
80	=	20	=	oz. 1		
5760	=	240	=	12	=	lb. 1

APOTHECARIES' MEASURE

<i>Minims</i>		<i>Fluid drams</i>		<i>Fluid ounces</i>		<i>Pints</i>		<i>Gallon</i>
m. 60	=	f 3 1	=					
480	=	8	=	f 3 1	=			
7680	=	128	=	16	=	O 1		
61440	=	1024	=	128	=	8	=	C 1

IMPERIAL MEASURE

<i>Minims</i>		<i>Fluid drams</i>		<i>Fluid ounces</i>		<i>Pints</i>		<i>Gallon</i>
60	=	1						
480	=	8	=	1				
9600	=	160	=	20	=	1		
76800	=	1280	=	160	=	8	=	1

LIQUID OR WINE MEASURE

<i>Gills</i>		<i>Pints</i>		<i>Quarts</i>		<i>Gallons</i>		<i>Hogs- heads</i>		<i>Pipes</i>		<i>Tun</i>
4	=	1										
8	=	2	=	1								
32	=	8	=	4	=	1						
2016	=	504	=	252	=	63	=	1				
4032	=	1008	=	504	=	126	=	2	=	1		
8064	=	2016	=	1008	=	252	=	4	=	2	=	1

DRY MEASURE

<i>Pints</i>	<i>Quarts</i>	<i>Gallons</i>	<i>Pecks</i>	<i>Bushels</i>	<i>Quarter</i>
2 =	1				
8 =	4 =	1			
16 =	8 =	2 =	1		
64 =	32 =	8 =	4 =	1	
512 =	256 =	64 =	32 =	8 =	1

LINEAR MEASURE

<i>Inches</i>	<i>Feet</i>	<i>Yards</i>	<i>Fathoms</i>	<i>Perches</i>	<i>Furlongs</i>	<i>Mile</i>
12 =	1					
36 =	3 =	1				
72 =	6 =	2 =	1			
198 =	16.5 =	5.5 =	2.75 =	1		
7920 =	660 =	220 =	110 =	40 =	1	
63360 =	5280 =	1760 =	880 =	320 =	8 =	1

SOLID MEASURE

<i>Cubic Inches</i>	<i>Cubic Feet</i>	<i>Cubic Yard</i>
1728	= 1	
46656	= 27	= 1

SQUARE MEASURE

<i>Square Inches</i>	<i>Square Feet</i>	<i>Square Yards</i>	<i>Perches</i>	<i>Roods</i>	<i>Acre</i>
144 =	1				
1296 =	9 =	1			
39204 =	272.25 =	30.25 =	1		
1568160 =	10890 =	1210 =	40 =	1	
6272640 =	43560 =	4840 =	160 =	4 =	1

METRIC LINEAR MEASURE

Millimeter	=	.001	of a meter
Centimeter	=	.01	" " "
Decimeter	=	.1	" " "
Meter	=		Principal unit
Decameter	=	10	meters
Hectometer	=	100	"
Kilometer	=	1000	"
Myriameter	=	10000	"

METRIC LIQUID MEASURE

Milliliter	=	.001	of a liter
Centiliter	=	.01	" " "
Deciliter	=	.1	" " "
Liter	=		Principal unit
Decaliter	=	10	liters
Hectoliter	=	100	"
Kiloliter	=	1000	"
Myrialiter	=	10000	"

METRIC WEIGHTS

Milligram	=	.001	of a gram
Centigram	=	.01	" " "
Decigram	=	.1	" " "
Gram	=		Principal unit
Decagram	=	10	grams
Hectogram	=	100	"
Kilogram	=	1000	"
Myriagram	=	10000	"

COMPARATIVE VALUES OF APOTHECARIES' AND METRIC FLUID MEASURES

<i>Minims</i>	<i>Cubic Centimeters</i>	<i>Minims</i>	<i>Cubic Centimeters</i>	<i>Fluid Ounces</i>	<i>Cubic Centimeters</i>	<i>Fluid Ounces</i>	<i>Cubic Centimeters</i>
1 = 0.06		25 = 1.54		2 = 59.20		21 = 621.00	
2 = 0.12		30 = 1.90		3 = 89.00		22 = 650.00	
3 = 0.18		35 = 2.16		4 = 118.40		23 = 680.00	
4 = 0.24		40 = 2.50		5 = 148.00		24 = 710.00	
5 = 0.30		45 = 2.80		6 = 178.00		25 = 740.00	
6 = 0.36		50 = 3.08		7 = 207.00		26 = 769.00	
7 = 0.42		55 = 3.40		8 = 236.00		27 = 798.50	
8 = 0.50				9 = 260.00		28 = 828.00	
9 = 0.55		<i>Fluid drams</i>		10 = 295.70		29 = 858.00	
10 = 0.60		1 = 3.75		11 = 325.25		30 = 887.25	
11 = 0.68		1½ = 4.65		12 = 355.00		31 = 917.00	
12 = 0.74		1¾ = 5.60		13 = 385.00			
13 = 0.80		1¾ = 6.51		14 = 414.00		32 or 1 quart	
14 = 0.85		2 = 7.50		15 = 444.00			
15 = 0.92		3 = 11.25				48 = 1419.00	
16 = 1.00		4 = 15.00		16 or 1 pint	= 473.11	56 = 1655.00	
17 = 1.05		5 = 18.50				64 = 1892.00	
18 = 1.12		6 = 22.50		17 = 503.00		72 = 2128.00	
19 = 1.17		7 = 26.00		18 = 532.00		80 = 2365.00	
20 = 1.25				19 = 562.00		96 = 2839.00	
		<i>Fluid ounce</i>		20 = 591.50		112 = 3312.00	
		1 = 30.00				128 = 3785.00	

¹ More accurately 29.57 c.c.

COMPARATIVE VALUES OF STANDARD AND METRIC LINEAR MEASURES

Inches Centimeters	Inches Centimeters	Inches Millimeters	Inches Millimeters
12 = 30.48	6 = 15.24	$\frac{1}{2}$ = 1.00	$\frac{1}{2}$ = 15.85
11 = 27.94	5 = 12.70	$\frac{1}{2}$ = 2.11	$\frac{1}{2}$ = 16.92
10 = 25.40	4 = 10.16	$\frac{1}{2}$ = 3.17	$\frac{1}{2}$ = 19.05
9 = 22.86	3 = 7.62	$\frac{1}{2}$ = 6.35	$\frac{1}{2}$ = 21.15
8 = 20.32	2 = 5.08	$\frac{1}{2}$ = 8.46	$\frac{1}{2}$ = 22.19
7 = 17.78	1 = 2.54	$\frac{1}{2}$ = 12.70	$\frac{1}{2}$ = 23.28

COMPARATIVE VALUES OF APOTHECARIES' AND METRIC WEIGHTS

Grains Grams	Grains Grams	Grains Grams	Drams Grams
$\frac{1}{100}$ = 0.00065	$\frac{1}{2}$ = 0.03240	23 = 1.460	1 = 3.90
$\frac{1}{80}$ = 0.00101	$\frac{1}{2}$ = 0.04860	24 = 1.55	2 = 7.80
$\frac{1}{60}$ = 0.00168	1 = 0.065	25 = 1.62	3 = 11.65
$\frac{1}{50}$ = 0.00200	2 = 0.130	26 = 1.70	4 = 15.50
$\frac{1}{40}$ = 0.00250	3 = 0.195	27 = 1.75	5 = 19.40
$\frac{1}{30}$ = 0.00333	4 = 0.260	28 = 1.82	6 = 23.30
$\frac{1}{20}$ = 0.00500	5 = 0.324	29 = 1.87	7 = 27.20
$\frac{1}{16}$ = 0.00625	6 = 0.400	30 = 1.95	Ounces
$\frac{1}{12}$ = 0.00833	7 = 0.460	31 = 2.00	1 = 31.10
$\frac{1}{10}$ = 0.01000	8 = 0.520	32 = 2.10	2 = 62.20
$\frac{1}{8}$ = 0.01250	9 = 0.600	33 = 2.16	3 = 93.30
$\frac{1}{6}$ = 0.01667	10 = 0.650	34 = 2.20	4 = 124.40
$\frac{1}{5}$ = 0.02000	11 = 0.715	35 = 2.25	5 = 155.50
$\frac{1}{4}$ = 0.02500	12 = 0.780	36 = 2.30	6 = 186.60
$\frac{1}{3}$ = 0.03333	13 = 0.845	37 = 2.40	7 = 217.70
$\frac{1}{2}$ = 0.05000	14 = 0.907	38 = 2.47	8 = 248.80
$\frac{1}{16}$ = 0.00648	15 = 0.972	39 = 2.55	9 = 280.00
$\frac{1}{10}$ = 0.00810	15.5 = 1.000	40 = 2.60	10 = 311.00
$\frac{1}{8}$ = 0.01250	16 = 1.040	42 = 2.73	11 = 342.14
$\frac{1}{6}$ = 0.01667	17 = 1.102	44 = 2.80	12 = 373.23
$\frac{1}{5}$ = 0.02000	18 = 1.160	48 = 3.00	14 = 435.50
$\frac{1}{4}$ = 0.02500	19 = 1.240	50 = 3.25	16 = 497.60
$\frac{1}{3}$ = 0.03333	20 = 1.300	52 = 3.40	24 = 746.40
$\frac{1}{2}$ = 0.05000	21 = 1.360	56 = 3.65	48 = 1492.80
	22 = 1.425	58 = 3.75	100 = 3110.40

COMPARATIVE VALUES OF AVOIRDUPOIS AND METRIC WEIGHTS

Avoir. Ounces Grams	Avoir. Ounces Grams	Avoir. Ounces Grams	Avoir. Pounds Grams
$\frac{1}{16}$ = 1.772	5 = 141.75	13 = 368.54	4 = 1814.37
$\frac{1}{8}$ = 3.544	6 = 170.10	14 = 396.90	5 = 2267.96
$\frac{1}{4}$ = 7.088	7 = 198.45	15 = 425.25	6 = 2727.55
$\frac{1}{2}$ = 14.175	8 = 226.80	Avoir.	7 = 3175.14
1 = 28.350	9 = 255.15	Pounds	8 = 3628.74
2 = 56.700	10 = 283.50	1 = 453.60	9 = 4082.33
3 = 85.050	11 = 311.84	2 = 907.18	10 = 4535.92
4 = 113.400	12 = 340.20	2.2 = 1000.00	
		3 = 1360.78	

APPROXIMATE VALUE OF DOMESTIC MEASURES

I teaspoon	=	5	c.c.	or	$\frac{1}{6}$	fluid ounce
I dessertspoon	=	10	"	"	$\frac{1}{3}$	" "
I tablespoon	=	15	"	"	$\frac{1}{2}$	" "
I teacup	=	118	"	"	4	" ounces
I large cup	=	236	"	"	8	" "
I tumbler	=	178-236	"	"	6-8	" "
I sherry glass	=	30	"	"	1	" ounce
I claret "	=	118	"	"	4	" ounces
I champagne glass	=	133	"	"	$4\frac{1}{2}$	" "

MEASURING SOLUTIONS

METHODS OF RECKONING THE AMOUNT OF DRUG NECESSARY TO USE IN MAKING SOLUTIONS

HOW TO RECKON THE AMOUNT OF DRUG TO USE IN
MAKING A SOLUTION OF A GIVEN PERCENTAGE.—

(1) Using Apothecaries' Measure—According to the apothecaries' measure, there are 480 minims or grains in the ounce, but, to facilitate reckoning in the making of solutions, the ounce is generally considered as having 500 minims or grains. Therefore, as 1 per cent. means one part in a hundred, to make an ounce of a 1 per cent. solution 5 minims or grains of the drug will be required, and to find out how much to use to make higher per cents. all that it is necessary to do is to multiply the required per cent. by 5. Thus:

To make a 2 per cent. solution 10 grains are required
To make a 5 per cent. solution 25 grains are required
To make a 10 per cent. solution 50 grains are required

When it is required to make more than 1 ounce, multiply the amount of drug necessary to make 1 ounce by the number of ounces required; thus, to make 1 quart (32 ounces) of a 2 per cent. solution there will be needed 320 grains ($5 \times 2 = 10$ and $10 \times 32 = 320$). (2) Metric System—In the metric system the per cent. specified gives the amount of drug necessary to use for every 100 cubic centimeters (c.c.) of

solution. Thus 1 gram is necessary for 100 c.c. of a 1 per cent. solution; 3 grams for 100 c.c. of a 3 per cent. solution, and so on. To find out how much of a drug to use to make larger quantities than 100 c.c., multiply the per cent. by the number of hundred cubic centimeters wanted; thus to make a liter (1000 c.c.) of a 5 per cent. solution, it will require 50 grams, because $5 \times 10 = 50$.

TABLE SHOWING THE AMOUNT OF DRUG TO USE IN MAKING ONE PINT OF SOLUTION, THE PINT BEING CONSIDERED AS CONTAINING 8000 GRAINS, OR 500 GRAINS TO THE OUNCE.

<i>Per cent.</i>	<i>Which is Equivalent to</i>		<i>Amount of Drug</i>
$\frac{1}{4}$	I	part in 400	20.00 grains
$\frac{1}{2}$	I	" " 200	40.00 "
I	I	" " 100	80.00 "
2	I	" " 50	160.00 "
3	I	" " $33\frac{1}{3}$	240.00 "
4	I	" " 25	320.00 "
5	I	" " 20	400.00 "
10	I	" " 10	800.00 "
20	I	" " 5	1600.00 "
25	I	" " 4	2000.00 "

CHAPTER XVIII

VISITING NURSING

Organization and Management—As Part of a Training School Curriculum—As an Adjunct to Hospitals and Dispensaries—Benefit to the Patients—For Tuberculosis.

BY MARGARET A. BEWLEY, R.N.

PURPOSE.—Visiting nursing is the care of the needy sick in their own homes, and should include instructing them in the laws of hygiene and sanitation, and rooting out and destroying the unwholesome conditions which cause the spread of disease. The visiting nurses' function is threefold: they are nurses, teachers, and inspectors; their skill and training are not used for their patients alone; they must teach other members of the family, and report to the proper authorities every unwholesome condition that menaces public health; their duty is to the community, as well as to the individual.

THE NURSE.—In establishing a system of visiting nursing it is essential that the nurse should have had some experience in the work; she should be a woman who is not only skilled in her profession, but who loves humanity. She must possess good health, a kind heart, an agreeable personality, and some executive ability. She should maintain strict personal neatness and observe professional courtesy and be willing to give her undivided attention to the work. She should

be familiar with the means and capable of meeting various emergencies that might arise in the work. She should know how to send a patient to the hospital, secure ambulance service, report cases for relief to charitable agencies, convalescent homes, etc.

ORGANIZING.—In starting the work in a new locality a general meeting of the public might be called, the project presented, and prominent physicians be asked to speak in indorsement; or the nurse may be introduced to those whose co-operation is most desired, by posting a circular letter to each physician, clergyman, school principal, to the heads of all charitable societies, departments of the poor, and to individuals engaged in charitable work.

SUPPORT.—The work may be supported in various ways, usually best by voluntary contributions from the public. In towns, large or small, with a mixed population, having no uniform employment, annual subscriptions and donations from all classes may be the chief sources of income. In mining collieries and manufacturing centres, where there is a uniform level of work, the men employed in the various industries may agree to a deduction of a certain sum weekly or monthly from their wages toward the support of an association. Other possible sources of revenue are the churches and chapels which may be asked to devote the collection of one Sunday in the year to the nursing fund. If operated upon the non-sectarian principle the support of all the elements may be counted on. Patients should be encouraged to give according to their means. A saving in the expense may be effected if the railway companies will give passes for the nurses.

OTHER ADJUNCTS.—A system may have many ad-

juncts operating in connection with it—a milk or soup kitchen, convalescent home, etc.

LOAN CLOSET.—There must be a loan closet containing every known article that may be used for the comfort and well-being of the sick: bedding, linen, blankets, gowns, breast and abdominal binders, rubber appliances, sheets, air cushions, hot water bags and fountain syringes, stomach and rectal tubes—utensils of all kinds.

RELIEF.—Besides the loan closet, which is drawn on in case of illness, there should be a relief fund to supply the necessities to keep patients well; such as abdominal belts, elastic stockings, braces, warm underclothing, blankets, etc.

In every system of visiting nursing, the right to ask for a nurse should be unrestricted. She should be for the benefit of the public.

CONTAGIOUS CASES.—The nurse should attend all cases except those of contagion. For contagious cases printed leaflets might be distributed with instructions how to isolate and care for the patient, to disinfect the clothing, dishes, etc., and to fumigate the room or house.

ADVANTAGES TO NURSES.—There are so many fields now open for nurses that it seems necessary for the training schools to add to their curriculum that instruction which will tend to direct the minds and interests of the student nurses to a broader field of usefulness, a better understanding of themselves and the work for which they are being fitted. Under proper supervision and instruction, they may be taught to adapt their nursing knowledge to the circumstances of the patients, and to make the best of the unfavorable surroundings and limited appliances

found in the home. Necessity will teach them to improvise and economize. They will learn to think of each patient as an individual as well as a case of illness—for under care at home progress is often dependent on the financial and social condition of the family. Their experience will teach them adaptability and resourcefulness, and develop and cultivate their abilities along humanitarian lines.

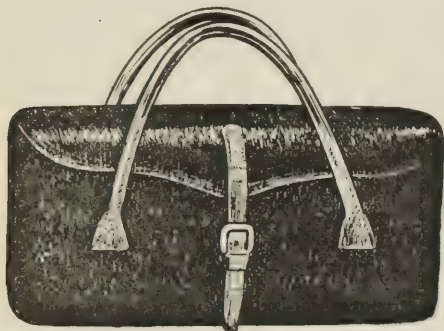
They should be expected to reason out things for themselves and develop their judgment, instead of appealing to some one in authority in all emergencies.

In establishing a system it might be well to have it carried on, for the first month at least, by the graduate nurse who is to have the supervision and instruction of the student nurses. This will allow time to build up a practical working basis, evolved from the existing conditions and the varying needs of the people for whom the work should be carried on. Beginning with one student nurse, the staff may be increased to meet the demands of the work.

The course should be elective. This will give the opportunity to the students who declare themselves interested and feel that they are best fitted for this particular branch of nursing. The term of service may be from two to three months, and given during the senior year in the school.

It is not necessary to adopt a special uniform if the uniform of the school is so made that it can be worn without a bib and apron. Should a special uniform be adopted, it would be advisable to have a plain shirt-waist dress made of suitable dark gingham in standard sizes and lengths, which can be procured at \$2.85 apiece. For winter service a coat and hat may both be made of warm durable material. A lighter weight

coat for spring and autumn, with a plain sailor hat, can be used. During the summer months no coat will



Nurse's Bag

be needed except on rainy days. The nurse should be held responsible for the uniform in use during her service.



Bag Opened

BAG. —A bag will be needed equipped with instruments, dressings, and medicines that are necessary

for use in the general nursing of a patient, or for the care of surgical cases.

The contents of a bag, with lining detachable should be:

- 1 Apron.
- 1 Hand-towel.
- 1 Hand-basin (for disinfecting).
- 1 Hand-brush.
- 1 Tan linen bag for sterile dressing.
- 1 Tan linen bag for unsterile dressing.
- 1 Tan linen bag for bandages and cotton.
- 1 Tan linen case for instruments, including scissors, forceps, probe, syringe, and rubber catheter.
- 6 Bottles containing
 - Alcohol (95 per cent.).
 - Alcohol (50 per cent., for sponge baths).
 - Green soap.
 - Hydrogen-Peroxide.
 - Listerine.
 - Bichloride tablets.
- Boric acid ointment.
- Boric acid powder.
- Talcum powder.
- Pocket in side of bag contains
 - Thermometers (2), bandage, scissors, spatula, adhesive plaster, safety pins.
- Formulas for baby feedings, blank bedside notes.

The actual nursing care of patients in their homes should be done in practically the same way as in the hospital wards.

TREATMENT.—Prescribed medical and surgical treatment may be given, such as cleansing baths, baths to reduce temperature, mustard baths for con-

vulsions in children, hot and cold packs, irrigations of all kinds, etc., surgical dressings following operations, dressings for burns and ulcers, massage, bandaging for varicose veins, etc.

METHODS TAUGHT.—The families should be taught the necessity of cleanliness, fresh air, and nourishing food; the simple methods of nursing, giving baths, making beds, preparing foods; when the patient is restless, how to induce sleep without resorting to medicines; the care and feeding of children; how to properly ventilate a room; the general hygiene of the house; also, how to take simple sanitary precautions against future cases of illness and the spread of disease.

The visits of the nurse should be long enough to do thoroughly for each patient all that is required.

The nurse should plan her day's work so as to see those the most seriously ill first in the morning and latest in the afternoon, in order to leave them as comfortable as possible for the night.

NUMBER OF VISITS.—It is difficult to say how many patients a nurse can care for during the day. The time spent in each household varies with the requirements of the case, the condition of house or room, and the distance between the patients.

RULES.—She is expected to be on duty eight hours daily, from 8 A.M. to 5 P.M., with one hour's rest at noon, an afternoon once a week, and a part of Sunday off duty. In summer, work may begin at 7 A.M. with two hours off at mid-day, and time must be allowed for classes and lectures.

The field for the work should be limited to a definite district, to save time, energy, and car fare, and to enable the nurses to do thorough work. This dis-

trict may be divided and each nurse may have her duties assigned to her. Each nurse must also take her share of the office work, making supplies, keeping records, etc.

Daily reports of all cases should be written by the nurses. For the dispensary staff, records may be posted in the dispensary, and when the physician is visiting the patient at home, complete bedside notes should be kept there for him. Any change of orders may be entered on same bedside note sheet by the physician.

SYSTEM OF RECORDS.—A card catalogue, composed of alphabetically arranged cards, like the one reproduced below, may well be made and will serve as an index to the histories of all patients, which should be kept on file.

No. 1526 *Age.* 34

Name. John Jones

Address. 224 East 71st St. *Floor.* 1. B. L. M.

Diagnosis. Typhoid Fever *Occupation.* Driver

Reported by. Dispensary *Nationality.* American

First Visit. Dec. 14, '08. *Last Visit.* Jan. 16, 1909.

Result. Dismissed Improved to Dispensary.

H. L. Johnson M.D. M. A. Smith Nurse.

The histories are the nurse's daily records of her work for each patient, in which are noted all symptoms, and the treatment given on each visit.

The following may serve as a model history sheet:

History Sheet

Date. December 14, 1908.

No. 1526.

Name. John Jones.

M.

Address. 224 East 71st St.

Floor. 1. B. L. *Age.* 34.

Nationality. American.

Occupation. Driver.

Reported by. Dispensary.

Room No. 12. *Patient's No.*

Hospital.

Diagnosis. Typhoid Fever.

H. L. Johnson *M. D.*

M. A. Smith *Nurse.*

Charity Interested.

Hygienic Condition.

Poor—4 dark, dirty rooms—2 adults—4 children. Pt. sleeping in dark room—no ventilation. No income—family destitute—rooms cold.

Dec. 14, 1908. T. 103—P. 100—R. 34. Pt. slightly delirious. Pain in head—takes nourishment fairly well. Pt. moved to lightest room. Wife instructed to keep window open and proper disinfection and cleanliness. Ice cap to head. General nursing. *Milk ticket 2 qts. daily given. \$1.00 spent for food and coal.*

Dec. 15, '08. T. 103⁶—P. 100—R. 26. Pt. restless during night. Some diarrhea—dejections involuntary. Severe epistaxis. Rose spots. *Refer to Charities for Relief.*

Dec. 16, '08. T. 104—P. 100—R. 28. Pt. very apathetic and very thirsty, drinks plenty of milk and water. Alcohol sponge given. *Sheets 3, P. Cases 2 Loaned.*

P. M. T. 104⁵—P. 100—R. 26. Pt. still has severe headache. Slightly delirious. Alcohol sponge.

9:30 A. M. *Visit of Physician—Orders unchanged.*

Dec. 17, '08. T. 104—P. 104—R. 26. Alcohol sponge. General nursing.

P. M. T. 104⁴—P. 100—R. 24. Alcohol sponge. General nursing.

Dec. 18, '08. T. 103—P. 100—R. 26. Pt. seems better. Sponges well taken. Tongue thickly coated.

Dec. 19, '08. T. 102³—P. 104—R. 28. General nursing.

Dec. 20, '08. T. 102—P. 100—R. 26. Pt. slept well. Abdomen rigid but not distended; greenish colored. Fluid dej. containing curds. Milk diluted.

P. M. T. 103—P. 100—R. 24. Alcohol sponge. General nursing. *Hot water bag loaned.*

Dec. 21, '08. T. 101⁸—P. 92—R. 24. Pt. perspir-

ing profusely. Looks brighter this A. M. *Milk ticket left.*

Dec. 22, '08. T. 101—P. 88—R. 24. Pt. is comfortable. Takes fluids well. Cleansing bath given.

Dec. 24, '08. T. 98⁶—P. 88—R. 24. General nursing.

Dec. 26. T. 98⁴—P. 88—R. 20. Cleansing bath.

Dec. 28. T. 98⁶—P. 88—R. 24. 9:30 A. M. *Physician's Visit.*

Soft boiled eggs allowed. General nursing.

Milk ticket 3 qts. Milk and 2 eggs daily left.

Dec. 30. T. 98⁶—P. 88—R. 20. Bowels move regularly. Milk toast allowed. General nursing.

Jan. 2. T. 98²—P. 80—R. 20. Allowed chicken. General nursing.

Jan. 4. T. 98²—P. 80—R. 20. *Physician's Visit.* Allow up in bed. *Milk ticket left.*

Jan. 6. T. 98²—P. 76—R. 20. Up in chair.

Jan. 8. T. 98²—P. 76—R. 20. Friendly visit.

Jan. 11. T. 98²—P. 76—R. 20. Up and about. *Milk ticket left.*

Jan. 14. Pt. out. Friendly visit. *Loaned articles returned.*

Jan. 16. Pt. out. *Dismissed to dispensary.*

Advantages of Visiting Nursing to Hospitals and the Public.

As an adjunct to hospitals and dispensaries, visiting nursing is indispensable. In regard to both, it may be justly said that, aside from the great life-saving factor in the work of the wards, no system can do more to bring needed relief and comfort to unfortunate members of a community where many are unable to afford the bare necessities, to say nothing of the luxuries, of an illness or convalescence at home. It relieves congestion in the hospital proper, and many more cases

can be treated in the wards. Patients can be discharged earlier, the subsequent minor dressings and medical care being carried out in the homes. Incidentally much can be done to assure the community from which a hospital draws its patients that those concerned with its management are interested in their patients' welfare, by following them a sufficient time after leaving the hospital to insure their actual restoration to health.

One great need in every hospital is to have someone inquire into the home conditions of patients who are to be discharged from the wards, to see if they are such as to retard their recovery. If so they should be sent to a suitable convalescent home for two or three weeks.

In every community there are some chronic cases who cannot be cared for in a hospital for any length of time, and few of them can be persuaded to enter one. The visiting nurse can do much to make them comfortable and happy in their own homes with their families about them.

The greatest scope for this work should be found among the dispensary class of patients. Many of them are not ill enough to require hospital care, but they do need some nursing. A patient may apply to one of the various departments of the dispensary for treatment. A thorough history of the case is taken, a physical examination made, the diagnosis arrived at, medication ordered, and he is told what must be done in order to get well. Very often these instructions mean very little to the patients, unless someone can show them how to carry them out.

The physician leaves written orders for the nurse for just what is needed. The case can then be visited

and the instructions explained in detail with a demonstration to the patient, or the nurse may carry out the instructions if they are too complicated for the patient to follow alone. A report of the patient's condition and progress can then be filed at the dispensary for the doctor to see, and in this way the case is helped and watched from day to day, changes in treatment made when necessary, and the patient ordered to report when needful. It can be seen that by a system of this kind many cases of serious illness can be prevented.

Tuberculosis Work.

There is not much real nursing care that can be given to tuberculosis patients. Their disease is chronic and few patients are confined to bed until near the end. Some of them are up and dressed until the day of their death.

For those who are confined to bed, general nursing can be given—a sponge bath, change of linen, etc.

As it is considered a home problem the greater part of the work is instructive or preventive, and must be carried on in the homes where the disease originates, and from which it is disseminated.

CAUSES.—Although the tubercle bacillus is the sole cause of the disease, anything tending to lower vitality will favor its development, such as poor and insufficient food, overwork, worry, surroundings—such as dark, damp, overcrowded dwellings—repeated colds, etc.

INSTRUCTION.—The instruction should not only be given to the patients who have the disease, but to those who are exposed and in danger of contracting it. They should be taught how to live; how to take

care of themselves and how to take care of others about them.

FRESH AIR.—They must be told of the necessity and value of fresh air and how to get it; to spend as much time out of doors as possible; to sleep alone in a separate room with the windows open no matter what the weather—the idea being to make every inhalation one of unbreathed air. Sometimes window tents may be used or small tents put up in the yards; porches and roofs may be utilized and have the advantage of preventing loss of heat in rooms where it might be needed. Steamer chairs, wheeling chairs, cots, and hammocks can be used as beds.

FOOD.—The attention of all patients should be directed to the necessity of taking plenty of nourishing and easily digested food in addition to their regular meals. The most nourishing forms are, milk, raw eggs, raw or rare beef and beef-steak.

PROPHYLAXIS.—In all cases of tuberculosis the infection of others can be prevented. In pulmonary cases the germs are in the sputum and, as expectorating is one of nature's methods of getting rid of the germs, they are dangerous or otherwise according to the care exercised in its disposal. If the patients are careful they are harmless. If they are careless, they are dangerous to others, and to themselves. They should never expectorate on the floor or in the street, where the sputum may dry and be swept or blown about as powdered dust and inhaled. They should never swallow their sputum, or they may infect other parts of the body.

The safest articles to use to receive sputum are paper napkins or paper cups—both can be burned. For economy the napkins may be cut in halves or

fours—each piece used only once and put into a paper bag. When the bag is full it should be burned. If metal or earthenware cups or vessels are used they should contain some water or a solution of lye and be emptied into a closet once or twice a day, and then boiled. Handkerchiefs or old cloths contaminate the hands, face, and clothing, and should not be used. The hands should be washed and the mouth rinsed before eating. Something should always be held before the mouth when coughing or sneezing. Separate dishes should be used by the patients, and boiled after each meal. The bed linen, wash cloths, and towels should be handled as little as possible and boiled before washing.

The most important work is with the advanced cases. It is generally difficult to persuade them to leave home, especially if the hospital to which they are taken is too far away for their relatives and friends to visit them. If they are kept at home, they must be isolated and every precaution taken to prevent the infection of others. Every home where the disease is known to exist should be kept under constant surveillance, the patients should be visited regularly, and the same instructions repeated.

When new or suspicious cases are found, they should be sent to a dispensary for diagnosis or treatment. An ideal plan would be to have all members of the family of a tuberculous individual systematically sent or brought to a clinic for examination. Very often, if they are left to come voluntarily, only a small percentage of the cases are discovered.

On the day following the first visit to the dispensary each patient should be visited in his home by a clinic nurse, and a thorough investigation made of the

social and financial conditions. A report of these investigations, on a printed form, should be filed with the clinical history. The patients should be weighed once a week and a record kept of their gain or loss.

RELIEF.—The burden of social investigation and relief generally falls upon the nurse who has the supervision of the patients in their homes, and it is important that she should be familiar with the various charitable organizations, societies, churches, etc., in her particular district to which she can turn for assistance. As far as possible, relief should be given through the already existing channels; it can thus be done more wisely and economically.

DAY-CAMP.—A necessary adjunct to every dispensary and clinic for tuberculosis patients, especially in large cities, is a day-camp for the care and treatment of moderately advanced ambulatory cases; a place where the patients who have not suitable homes may go for the day and rest and receive plenty of nourishing food and fresh air. By having them brought together in this way daily, under close supervision, with continued instructions, and the hope of permanent benefit kept ever before them, much can be accomplished. This also gives the patients an opportunity to learn by observation, and they should be encouraged to believe that their recovery rests upon their own efforts. This day-camp might also be used as a night-camp for a different set of patients—those who are able to work during the day, who either live in poorly ventilated furnished rooms, or in such homes as do not offer proper conditions for them at night.

CHAPTER XIX

HOSPITAL PLANNING, CONSTRUCTION, AND EQUIPMENT

By BERTRAND E. TAYLOR, A.A.I.A.

IN making a study of the hospital field, one is immediately impressed with the fact that there are scarcely two hospitals even approximately alike, either in general scheme or in detail.

One reason for this is that most large hospitals have been developed from small institutions, by additions and alterations along the line of least resistance, and have never, or rarely, been the legitimate development of a consistent scheme.

Principles have gradually been evolved and demonstrated, but each hospital has been, in a way, a law unto itself.

Site

All experts agree that the ideal hospital site should be reasonably accessible, but as far isolated as possible from all deleterious conditions; that is, noise, smoke, dust, etc.

The most perfect conditions are found in a lot of considerable elevation, sloping generally south, open to the south and southwest, protected if possible on the north; so as to insure the maximum purity of air, the utmost benefit from sunshine, and prevailing winds in summer.

Care should be taken that not only the future growth of the hospital is as carefully discounted as possible, but that the future growth of the city or town is foreseen, to the end that the hospital may not be ruined by noise and smoke of railroads or manufacturing establishments, and the higher the site the less the likelihood of interference. In a level country other considerations must obtain.

Electric car service is very important, but unless the hospital is in the centre of a large lot, the hospital would better be a block removed from the line.

The ideal size of a hospital lot varies with conditions. In a large city the land is necessarily limited. In a smaller city a hospital should be in the suburbs, where the extraneous conditions are most favorable and the land reasonable in price. Under these conditions the lot should contain from five to ten acres at least, giving an opportunity for liberal planting of trees and shrubbery, isolating the buildings in what should become a beautiful park; provided with walks, flower beds, seats, and arbors, for the convalescent, and airing lawns under shelters and trees for those brought out in beds and on wheel stretchers for the vital open air day by day. Roofs are valuable, balconies necessary, but Mother Earth, clothed and beautiful, has a certain inherent vitalizing influence not excelled.

CONVALESCENT BRANCH HOSPITALS.—Many cities have a convalescent branch in the near-by country or suburb. Is not this a "cart before the horse?" It is a question if in the future the hospital would not better be in the country, under most ideal surroundings, and the branches organized as emergency

or first relief, examination, or out-patient, hospitals, acting as feeders to the main hospital.

The Type of Plan

There has been a great deal of discussion about the ideal hospital plan—whether it is a one-story pavilion scheme, like the “Virchow” of Berlin with fifty-three separate buildings, necessitating an enormous area (in this case 96 acres), or the other extreme, Dr. Ochsner’s ideal, the multiple-story hospital of small ground area.

Dr. Goldwater advocated the hospital of many stories for large cities, of the type latterly developed in New York; not a tower, but a sane demonstration of necessities.

After all, this part of the problem is very simple. The causes that operate to produce a skyscraper apartment house or hotel must inevitably result in approximately this same type of hospital. The causes that operate to produce cottages in a village, must of necessity produce the cottage hospital. The great mass of hospitals are, and are to be, of neither of these extreme types, therefore they are not worth while studying in this article. The hospital that must be built in all the lesser cities and larger towns must, of necessity, be of the isolated pavilion type, except in cases of special hospitals, private hospitals, memorial hospitals, etc., that are not of the normal, general, hospital type.

This average popular type of general hospital is scarcely ever built at once. It is usually started on a small scale and gradually developed into a large or comparatively large institution. This has been the

history of most of the hospitals in America, many of them being the larger and better known. This being inevitable, the pavilion type is of absolute necessity for extensive enlargements, and the necessary changes cannot be properly carried out in a "one-building" hospital after it is in commission.

In the ideal, the buildings must be sufficiently isolated so that there is no interference, that is, no noise communicated from one to the other, nor the sun and air kept from the wards. Then they must not be too spread-out, for the cost of construction, of service, piping, and management would thereby be greatly increased.

The height of pavilions must depend on the size and future possibilities of the institution. In a very small hospital of limited future, the one-story type is best. In a larger place, a two-story pavilion scheme is more economical of construction and service. In a large city economics should dictate a plan of three- to six- or eight-story pavilions; but with the average general hospital, the type should be the two-story ward pavilions.

Proportion of Hospital Accommodation to Population

Formerly one bed to every thousand people was thought ample. Later it was found that in entire States the proportion had risen to one bed to every 150 and in one case to one bed to 125 people; but this included all classes of hospitals and is no guide as to the accommodation that is required in any given case. The use of hospitals varies so greatly that no safe general rule can be given.

Cost of Hospitals

The cost of hospitals is much greater than it was twenty-five years ago, for the following reasons:

1. The greatly increased cost of materials and labor.
2. The greatly increased standard of construction; that is, the substitution of fireproof materials.
3. The great increase in the cubic contents of hospitals per bed, owing to the increased classifications and the great expansion of the utilities.

This latter has been a steady growth, and is very interesting to trace. Most foreign hospitals had, and in many cases still have, very meagre utilities, occupying not more than 25 to 30% of the pavilion or ward unit. One of the most recent, the Royal Infirmary Glasgow, has utilities that occupy a little over 40% of the total. Some American hospitals ten years old have utilities occupying 30%, but noted recent plans show a great change. The Cincinnati hospital has about 48% for a 24-bed ward.

Dr. Billings's plan for the new Brigham hospital, near the Harvard Medical School, has about 56% of utilities or about the same per bed as the Cincinnati.

The Watts Hospital, Durham, N. C., has a little larger percentage, but for a smaller ward.

From the above, it is safe to conclude that the utilities should properly occupy as much space as the ward, and much more if the ward is small.

The cost of hospitals is usually figured by hospital people at so much per bed. This looks practical, but is usually very misleading. If a hospital is built complete with all its bed capacity, this would be a fair method; but as such is almost never the case

the cube-foot estimate of the architects should be used.

Hospitals usually cost from \$2000 to \$4000 per bed, according to location, class, size, etc., and the cube-foot cost is usually from 20c. to 40c.

Several recent hospitals have cost more than these extreme figures, but it may be safely affirmed that a hospital, with brick exterior and wood interior, cannot be built for less than the lowest figures, and that a hospital with fireproof construction will inevitably cost approximately the higher.

The Ward Unit

The business of a hospital is to properly care for the sick and assist in every way in getting them well as fast as possible. Therefore, the ward unit is of vital importance and should be the first consideration.

This ward, be it ten beds or twenty beds, should have its longitudinal axis north and south, with windows between each two beds and, if possible, a glazed solarium at the south end. It is quite customary to isolate this solarium from the ward, or to have only a glass partition, but it is much better to make it a part of the ward, like a large bay window. It then seems to vitalize and beautify the entire ward.

According to Dr. G. H. M. Rowe, one of the most experienced of hospital superintendents, a ward may be 28 ft. wide. Two standard hospital beds 6' 6" each, placed two feet from the wall, would leave 11 feet working space in the centre of the ward. Beds should not be less than 4 feet apart, and more in special cases, and the floor space per bed would be 14' x 7'.

Adding the extra space in the solarium would bring the area, per bed, up to 110 or 112 sq. ft. The ward should be about 12 feet clear height, which would give, with the window spaces, over 1400 cu. ft. per bed, which is ample, except for specially offensive cases.

Sometimes a large ward is divided longitudinally so as to separate medical and surgical cases when better classification is impossible. This makes two imperfect wards, having none of the advantages of continuous sunshine, cross draughts in very hot weather, open solarium, etc., and an eminent authority has decided that the mingling of the two would be preferable.

A fireplace is a desirable feature, but not necessary and is seldom introduced.

Every ward should have a balcony, and one or more of the windows should be at least 4'0" wide and reach to the floor, so that beds can be easily rolled out for the day. This balcony should be, if possible, fireproof and have an iron fire escape.

The balcony should be level with the floor and at least 9'0" in width, with iron railings 4'0" high. There should be call bells leading to the nurses' table and electric lights.

The upper balcony should have an awning to be let down to protect patients from sun or shower.

The utilities of a ward unit are practically the same for a large or a small ward, therefore it is economy to build a large ward. A twenty-bed ward with its adequate conveniences would not cost much more than a ten-bed ward similarly equipped, and is, therefore, a much wiser investment than two ten-bed wards. If a twenty-bed ward is too large a unit at the start,

then the utilities should be complete and ample, and the construction arranged so that the ward could be extended toward the south when the full capacity is needed. A twelve- or fourteen-bed ward is as small as should be built, except for special cases or small departments.

The utilities consist of the toilet room,¹ connected with the ward through a ventilated tower. This should be at the back of the ward, not at the front as in the British hospitals, for here we wish to have the solarium, not one or two towers that cut off most of the sun and air from the ward during the best part of the day. This toilet should have two water closets and two lavatories and should be perfectly lighted and ventilated.

The bath room should have a tub in the centre of the room, and may have an extra water closet and lavatory for emergency use.

There should be a linen closet with movable slat shelves, and a folding table under the window, heated by coil under lower shelf to warm and dry linen and blankets. A clothing room with special racks for each patient. A special or treatment, massage or surgical dressing, ward, say 10' x 13' or 14'. An isolating ward of the same size, farthest removed from the open ward. The service corridor should be 8' 0" wide, so as to easily turn a bed or stretcher, and all doors to wards should be 3' 6" to 4' 0" wide. On the other side of the corridor should be the staircase and

¹ There are those who contend that, for greater convenience, the toilet room and linen cupboards should open from the side of the ward and about in the middle of the side.

A closet with steam pipes for drying sheets and rubbers used for baths is also a desideratum.—A. E. P.

elevator. These should be cut off from the ward corridor so as to isolate each floor; both in case of fire, and to prevent passage to upper floor entering corridor of lower.

Next the elevator, and farthest from the ward should be the ward or diet kitchen, thus insuring the minimum of disturbance. This room is generally too small, and for a large ward can scarcely be too large. For a twelve-bed ward it should never be less than 12' x 14'; 14' x 16' or more would be better. It should have a special, metal car, food lift running to basement corridor, by hand power if necessary, though automatic electric would be far preferable. There should be a double sink, one end deep and fitted with a steam pipe and valve so that dishes can be boiled by live steam. A steam table that could be heated by gas or hot water, if steam is not available in summer. This table should have at least four jars of porcelain, tinned copper, or stoneware, a covered meat platter, and two gas or electric plates for special work. There should be a dresser or dish cupboard with glazed top, broad shelf, and drawers and cupboards under.

The ward refrigerator should be porcelain-lined with no joints or corners; or an insulated cement-covered and lined refrigerator, built in, with round and coved corners finished inside and out in enamel.

For tray setting, either a long table, which with other fixtures should be in the centre of the room, or one or two gas-pipe tray racks, holding as many trays as there are beds, leaving eight- or nine-inch spaces between the trays; all arranged so that a number of nurses can work at the same time.

The convalescent dining-room should be propor-

tioned to the size of the ward, not less than 12' x 14', next to the kitchen.

The nurses' work room or utility room should be next the ward for convenience. It should have a water closet and lavatory with a window, in a closet, connected, for nurses' private use. There should be a heated and vented drying shaft for brooms, mops, cleaning and wash cloths, dusters, sponging blankets, rubber sheets, ward clothing, and such other things as need drying.

If possible there should be an airing balcony for airing and storing various articles and exposing them to the sunshine, especially in summer when the airing shaft ventilation may be sluggish. This balcony should be enclosed by a tight railing 4 ft. high, so that articles may not be visible, and the door, which should be glazed full length, will air and cool the room and make it comfortable in summer. Clothing, bedding, and mattresses can be aired on the second story corridor open balcony.

There should be an ice-box and soapstone sink with strong drainer for the preparation of ice-packs, filling hot water bottles, etc. If it is thought safe to have a soiled-linen chute, it should open into this room, with a galvanized iron door. It should be a cylinder of galvanized iron, vented at the top and discharging into a cement-lined room in the basement, with floor drain so that the walls and floor can be washed with a hose. There should be a movable pipe-rack, aluminum-bronzed, for holding ward crockery and utensils, and a sterilizing slop hopper; a closet with shelves and drawers above and lockers below for supplies, and a lined and vented closet for stools, etc. There should be a basin or utensil-sterilizer.

The floor should be of terrazzo, marble, or tiles, and the walls, to a height of 6 ft., of the same or of Keene's cement. The door should be tight and the room well ventilated.

The nurses' station should be in the corridor,¹ with call bells over, and the medicine closet near, fitted with small bowl and shelf of tinned copper, high pantry cocks, plate glass shelves, and electric or gas light.

The house telephone should be in a room, kitchen, or utility, so that patients in the ward cannot hear reports, etc.

All doors to wards or treatment rooms should be at least 3' 6" wide, and all doors to diet kitchens, utility rooms, large ward, should be double swing doors with a small clear glass insert, so that a nurse can see if another is coming.

There should be transoms reaching to the ceiling, over corridor doors generally, so as to give as much light as possible.

Windows in toilets, baths, utility, etc., should be 3' from the floor. Windows in all wards should reach from 20" above the floor to the ceiling. Transoms are not used ordinarily, as they are very difficult to shade and it is almost impossible to wash them. No blinds are used, either inside or out, dark holland shades being more easily managed, and they will control the sunshine sufficiently.

A special ventilating sill assists materially in ward ventilation.

¹ Some superintendents object to having the nurses' station in the hall, thinking that nurses can do their writing, etc., in the ward, and watch the patients at the same time.

Connecting Corridors

The various buildings, with the exception of the nurses' home, boiler-house, and laundry, should be connected by corridors. These should have a basement for service, heating, gas and plumbing pipes, electric wires, etc. The first story should be enclosed and filled with windows on the south side, with less on the north. The roof should be flat and enclosed with a parapet or iron railing, making an open-air connection between the buildings, valuable also as an airing balcony for the second story patients.

The length of these corridors depends upon the position of the buildings, usually from about 40 to 60 feet.

The ideal finish of the walls is brick, either laid face brick style or enamelled.

The Operating Department

This department has grown, in a quarter of a century, from one room to six, and even eight in some cases. A reaction, however, is apparent, for one of the largest and most magnificent of recent hospital constructions has consolidated the sterilizing, instrument, nurses' service, and supply rooms in one large room, placed between the two operating rooms.

This department can be in a separate special building, in a rear (north) extension of the surgical pavilion, or in the top of the administration building. In most respects the second is most economical and most convenient. It can be a one-story extension, or a two-story building with the maternity department

on the first floor and the operating department on the second floor, the operating department being used for delivery where it is necessary to economize.

The necessities of this department are:

1st, an operating room at least 15' x 20'.

2d, another operating room 15' x 20' (this could be a little smaller than the first.)

3d, a sterilizing room opening, if possible, into both operating rooms, 12' x 14' or more. This may contain instruments, if in tight glass and iron cases, supplies, nurses' utilities, etc.

4th, an ample surgeon's dressing room fitted with antiseptic lavatories, water closet, and possibly a shower bath. This latter is frequently put in, but seldom used, so its necessity is questioned.

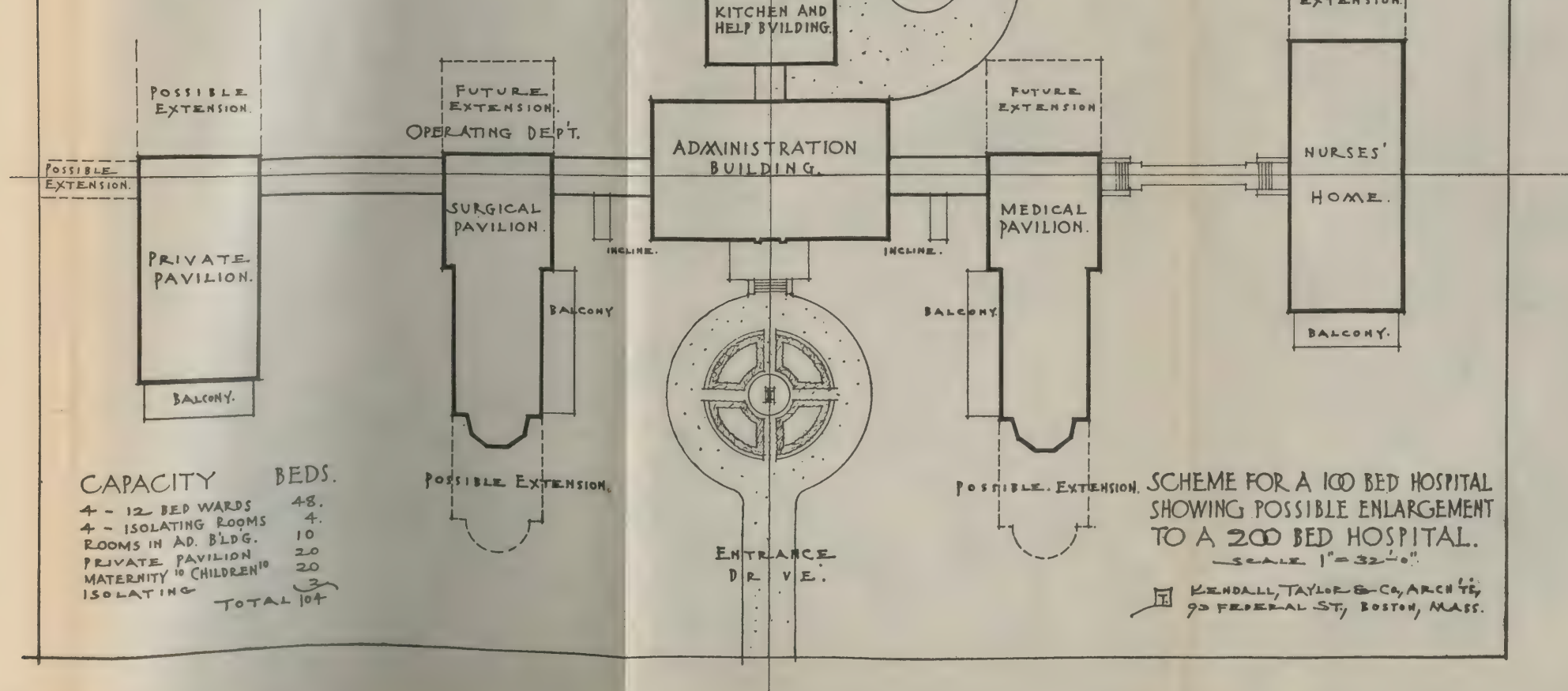
5th, there should be an anesthetic room, large enough for a bed and a wheel stretcher, which can also be used for a recovery room.

6th, a nurses' dressing room and toilet, and a supply closet.

The sterilizing room should contain hot and cold water sterilizers, dressing sterilizer, large pan sterilizer, one instrument sterilizer, and a steam-heated closet for warming blankets and saline solutions.


It is very convenient to have an instrument sterilizer also on the wall of each operating room.

The lighting of both operating rooms should be through large double-glazed windows running from 3' above the floor to the roof and continued from 8' to 10' up the slope of the roof, so as to give the maximum amount of concentrated north light without any break.



on. SCHEME FOR A 100 BED HOSPITAL
SHOWING POSSIBLE ENLARGEMENT
TO A 200 BED HOSPITAL.

SCALE 1" = 32'-0"

 KENDALL, TAYLOR & CO, ARCH'TS,
93 FEDERAL ST, BOSTON, MASS.

The Administration Building

The almost universal demand for an imposing, dominating central feature in a group of hospital buildings has resulted in crowding much into the administration building which really belongs elsewhere. The purely administrative necessities are very limited; namely, reception or waiting room, office, record room, dispensary or drug room, examination room, doctor's room, and trustees' room. The matron's suite, consisting of sitting room, bedroom, and bath, is frequently placed on the first floor, as are the interne's room or rooms and bath; especially if the second floor is used for private rooms or a special department. The rear of the administration building usually contains the nurses' and staff's dining rooms. A nurses' lecture room is much better placed here than in the nurses' home, which should be a women's building.

Dr. Corwin, of the Minnequa Hospital in Pueblo, has a small administration building, containing only the necessities; placing the patients in their various buildings, the nurses in theirs, and the superintendent and staff in theirs. This seems the comfortable and legitimate scheme.

The Kitchen

Unquestionably the best arrangement for the kitchen is a separate one-story building, semi-isolated from the rear of the administration building, on the basement level; so that the food truck can be run through the basement corridor to the various food lifts in basements under diet kitchens. This kitchen

should have an open roof with a monitor filled with glass, opened and closed by greenhouse fixtures. The importance of perfect light and ventilation cannot be overestimated. Every part of the kitchen should be visible, and as capable of perfect cleansing as an operating room.

All racks and shelving should be of steel pipe, aluminum-bronzed, with steel racks and slate shelves. All sinks should be of iron on pipe legs, set away from the wall to prevent fouling and insure perfect cleansing. All ranges, kettles, etc., should be in the middle of the room.

The minimum installation of fixtures is:

1, A large French range, preferably double-faced, with vented hood over all. 2, A large gas range. 3, An upright oven for bread, cake, etc., is wanted by some, but is not necessary with the ranges and bake oven. 4, A steam vegetable cooker. 5, A steam stock kettle. 6, Tea and coffee urns, and, possibly, a jacket kettle.

A small hospital could get along with less and a large one would require much more.

Kitchen Accessories

COLD STORAGE ROOMS.—Whether refrigeration is by ice or by refrigerating coils from an ice plant there should be a large three-compartment refrigerator, specially designed and built in place; two parts opening, usually, into the meat-cutting room and the third, a cook's refrigerator, into the kitchen. The insulation should be perfect, and the doors special and large enough to walk in through. The ice-box should be ample to keep the different compartments at the

EXHIBIT A

THE PRESBYTERIAN HOSPITAL IN THE CITY OF NEW YORK.
 New York City, N. Y., April 15 1908
 To Charles T. Davis Dr.
 Address 556 Dean St. Brooklyn N.Y.

1908 This Voucher, when approved by the proper official of the Hospital, is payable in current funds at THE MERCHANTS' NATIONAL BANK, NEW YORK CITY, when receipted in accordance with the direction below, printed in red ink.

March 21	For Bedside Tables, Surgical Instruments and Repairing of	165.60	
23	Surgical Instruments, Enamelled Basins, Rubber Spouting,	12.98	
23	Glass Slides, Plate Glass Slabs, Catgut, etc; as per bills	27.52	
23	of date named.	72.11	
30		140.43	
31		13.63	
31		21.69	
31		23.38	
31		492.00	526.48
	Exhibit "A"		
	< Actual Size of this Voucher is 8" x 9 3/8" >		

I certify that I have examined all extensions, additions and calculations in the above account and find them correct, and have entered the account on the books of the Hospital and the same has not been previously entered or paid.

Frederic B. Marshall Chief Clerk.

I certify that the above account is correct and has been incurred for the benefit of THE PRESBYTERIAN HOSPITAL.

Charles T. Davis Superintendent.

April 18 1908 Received of THE PRESBYTERIAN HOSPITAL IN THE CITY OF NEW YORK.

Five Hundred & Twenty Six 48 Dollars,

in full for the above account.

Form 1-40-30 (Sign here.) Charles T. Davis

READ THIS. The above Receipt must be dated and signed by the party in whose favor this Voucher is made; or when signed by another party, the authority for so doing must in all cases accompany it. This receipt must NOT be cut off from the body of this voucher.

FACE OF VOUCHER

PAYABLE AT
 THE MERCHANTS' NATIONAL BANK,
 OF THE CITY OF NEW YORK.

Pay NASSAU NAT'L BANK,
 of Brooklyn, or order,
 CHARLES T. DAVIS.

Exhibit "A"
 < Back of Voucher >

THE PRESBYTERIAN HOSPITAL
 IN THE CITY OF NEW YORK.
 Madison Avenue and 70th St. New York, N. Y.

Voucher No. 3705 Amount, \$ 526.48
 Favor of Charles T. Davis
 Month of March 1908

DISTRIBUTION.		
Administration Expenses:		
Office Expenses		
Stationery, Printing and Postage		
Telephone and Telegraph		
Legal Expenses		
Miscellaneous		
Professional Care of Patients:		
Salaries of Instructors		
Equipment for Nurses:		
Uniforms		
Books		
Instruments		
MEDICAL AND SURGICAL SUPPLIES		
Apparatus and Instruments	418.32	
Medical and Surgical Supplies	27.10	
Alcohol, Liquors, Wines, etc.		
DISPENSARY	9.12	
EMERGENCY WARD	4.11	
VISITING AND HOME NURSING		
X-RAY SERVICE		
Department Expenses:		
AMBULANCE	14.38	
PATHOLOGICAL LABORATORY	24.04	
LOGS-SERVING	14.23	
KITCHEN		
LAUNDRY		
STEWARDS' DEPARTMENT		
PROVISIONS:		
Bread		
Milk and Cream		
Groceries		
Butter and Eggs		
Fruits and Vegetables		
Meat, Poultry and Fish		
General House and Property Expenses:		
Electric Lighting		
Fuel, Oil and Waste		
Cars		
Ice		
Insurance		
Maintenance, Real Estate and Buildings		
Maintenance, Machinery and Tools		
Plumbing and Steam Fitting		
Miscellaneous		
Corporation or Other Current Expenses:		
GENERAL MATERIAL		
Capital Expenditures:		
TOTAL, 526.48		

BACK OF VOUCHER

EXHIBIT A



required temperature. The floors should be carefully insulated and finished with terrazzo. The walls are preferably of opaque glass, or a cement finish enamelled, but wood sheathing in spruce or pine is generally used. The racks, hooks, etc., should be of galvanized iron, and the shelves movable and of slate.

The ice door should be outside, and there should also be an ice-box for ice to be used in the ward for ice packs, diet kitchens, etc.

Contiguous to the kitchen should be the bakery, if in a large hospital, with flour room and bread room, with a portable tile oven, bread trough, electric bread-mixer, sink, etc.

A scullery with vegetable sink, ice-cream freezer, and motor. The butcher shop. Servants' dining room. Large special nurses' diet kitchen, with gas range, sink, portable refrigerator, etc. The various store rooms, a grocery, root cellar, toilet, etc., should all be as accessible as possible.

The nurses' and staff dining rooms, with serving room and lift between, should be in the rear of the administration, as nearly over the kitchen as possible.

GARBAGE.—The only method of disposing of garbage from ward kitchens seems to be in a light metal can or covered pail, frequently removed and steamed. For the main kitchen there should be either a small aired and vented garbage house at the rear of the kitchen, lined with cement, with hose and floor drain, for housing the garbage cans, or the regular sanitary garbage pails set in iron receptacles in the ground outside the kitchen door.

Private Pavilion

The private wards should be by themselves in a special pavilion. They should vary in size from 9' x 12' up to 12' x 14' or more, so as to suit all purses. They should have closets, and fireplaces where possible, to make them homelike. Suites should be arranged at the south end of the building, consisting of sitting room, bath and bedroom, that could also be used for a private nurse or attendant, or could be let separately if desired.

There should be ample solaria, sitting rooms, airing balconies, consultation and treatment rooms, and the usual ward utilities, except dining room, the sitting room answering for this purpose.

All beds should have the head to the outside wall, beside a window, so that the patient's eyes are not facing the window. The door should be opposite the window, so that there will be no draught across the bed if the door and window are both open. Thus there would be ample room for furniture, and for a wheel stretcher to be brought in beside the bed to transfer a patient. Beds should not be nearer than 1½ feet to the wall, so that a nurse can get around them.

Out-patients' Department

This is very individual, varying from one room in a very small hospital to one or two large buildings in a large hospital. There is no standard, as the requirements vary in practically every case.

Men's Quarters

There seems to be no good place for the men servants in a 100-bed hospital. There may be an engi-

neer, a day and a night fireman, a cook or baker, a laundryman, an orderly or porter, possibly a boy or two. There would be a less number in a smaller hospital. Their rooms may be in the basement of the administration building, or sometimes over the garage. They must be by themselves, and can be in double rooms with bath and toilet.

Women Servants

The women servants are usually given rooms in the attic of the rear portion of the administration building, or, if the kitchen is not a one-story building, as it should be, over the kitchen. They should have single and double rooms, a bath and toilet, all conveniently arranged. In the south, servants' quarters would be built entirely separate.

The Nurses' Rooms

It is quite customary to put the nurses into the upper portion of the administration building. This is necessary in a small hospital and as a temporary expedient in starting a hospital, but is only a makeshift.

The nurses should be housed in a separate building, specially designed for their accommodation. This building should be conveniently located, so as to be heated from the hospital plant and save the nurses steps in getting back and forth to their work. If it could have a subway for piping and for the use of the nurses in stormy weather, it would be well.

The generally accepted plan is that of a plain rectangular building two stories and a half in height,¹

¹ In the larger city hospitals the nurses' home has generally more stories—say from five to eight.—A. E. P.

having in its basement a large trunk room with raised platforms for trunks, a small nurses' laundry and drying room with two set tubs, and store rooms.

The first floor contains a large reception room or library convenient to entrance, a small tea kitchen, a lecture room (if this cannot be had in the administration building), the head nurses' room, office and bath, and single rooms. The second and roof stories contain single rooms only, with closets, toilets, and baths, linen and sewing rooms, and bedding closet, maids' or service closet, etc.

The minimum size of nurses' rooms is 8' x 10' with closet added, 2' 8" x 3' 6" inside. There should be two staircases, or one and fire escapes, and a large veranda with balcony over.

The public portions, that is the reception room, lecture room, library, etc., should be so arranged as to isolate the nurses' rooms on same floor. There should be special rooms above, isolated, for night nurses to sleep in during the day. The toilet facilities should be ample, with enough lavatories to eliminate the necessity of using wash-bowls and pitchers in the rooms. The usual furniture is very plain and strong, with enamelled iron beds, special high-leg bureau, rocker, one wood chair, small table, and special nurses' bookcase-desk secured to the wall.

Isolating Contagious Cases

Every hospital may have a contagious case develop within its walls, that is too ill to be taken away to a special isolating hospital. There should, if possible, be two rooms, with a bath and toilet, diet kitchen, and service room, thoroughly isolated from the other

EXHIBIT B

Form 10-1-15

THE PRESBYTERIAN HOSPITAL

Engineers

Pay Roll for Month

Ending March 31

1908

Voucher No. 3666

Sheet No. 19

NAME	OCCUPATION	No. of Days	Rate	Amount Paid	SIGNATURE	REMARKS
Amount brought forward,				8051.06		
John B. Prentice	First Assistant	31	110.00	110.00	John B. Prentice	Increase 10.00
Thomas Burns	Second Assistant	31	90.00	90.00	Thomas Burns	
John Collins	Third Assistant	31	80.00	80.00	John Collins	
George Harding	Clerk	31	70.00	70.00	George Harding	
Francis Kerns	Fireman	31	65.00	65.00	Francis Kerns	
Daniel Casson	Fireman	31	65.00	65.00	Daniel Casson	
Anthony Dahlman	Fireman	31	60.00	60.00	Anthony Dahlman	
Peter Endardy	Fireman	31	60.00	60.00	Peter Endardy	
Patrick Mahoney	Carpenter	31	80.00	80.00	Patrick Mahoney	
Charles Murphy	Carpenter	31	70.00	70.00	Charles Murphy	
George Langan	Painter	31	80.00	80.00	George Langan	
James Carlson	Painter	14	93.00	42.00	Time Check No. 9547 - March 14/08	
James Muldoon	Extra Painter	17 1/2	93.00	52.50	Time Check No. 9560 - March 18/08	
James Brennan	Elevator Runner	31	32.00	32.00	James Brennan	
William Kendall	Elevator Runner	31	25.00	25.00	William Kendall	
				989.50		
					Exhibit "B"	
					< Actual size 9 1/2" x 14" >	
Grand Total Pay Roll for Month				9033.56		
Total or Carried Forward,						

I certify that the above mentioned persons were employed as shown and that the respective amounts are due them as set forth.

Calvin E. Baker
Superintendent.

I certify that I have examined all extensions, additions and calculations in the above account and find them correct and have entered the account on the books of the Hospital and the same has not been previously entered or paid.

Madeline B. Moslok
Chief Clerk.

Paid as above except as noted.

Madeline B. Moslok
Chief Clerk.

PAY ROLL (FACE)

Voucher No. 3666

Amount \$ 9033.56

THE PRESBYTERIAN HOSPITAL.

PAY ROLL DISTRIBUTION.

Month of March 1908

Administration Expenses:	
Salaries, Officers and Clerks	1346.78
Telephone and Telegraph	71.00
Miscellaneous	
Professional Care of Patients:	
Physicians	305.83
Staff of Nurses, Assistant, and Instructor	600.80
Nurses	146.84
Special Nurses	42.76
Orthotics	
Special Dietaries	
Ward Employees	173.30
EQUIPMENT FOR NURSES:	
Uniforms	120.60
MEDICAL AND SURGICAL SUPPLIES	
Apparatus and Instruments	11.10
X RAY SERVICE	50.00
DISPENSARY	360.17
EMERGENCY WARD	126.30
VISITING AND HOME NURSING	27.80
Department Expenses:	
Ambulance	12.00
Pathological Laboratory	49.78
Training School	
Housekeeping	123.83
Kitchen	422.30
Laundry	42.50
Steward's Department	71.00
General House and Property Expenses:	
Electric Lighting	19.10
Maintenance, Real Estate and Buildings	185.00
Maintenance, Machinery and Tools	176.00
Plumbing and Steam Fitting	37.00
Miscellaneous	
Corporation or Other Current Expenses:	
Salaries, Officers and Clerks	266.10
Miscellaneous	
Current Expenses from Special Funds:	
Capital Expenditures:	
Machinery and Tools	123.00
TOTAL	9033.56

Exhibit "B" - (Back of last sheet of Pay Roll.)

PAY ROLL (BACK)

rooms, reached through an open-air balcony, in which to care for such cases and prevent infection. These wards can, if properly constructed, be thoroughly disinfected and used for a variety of cases. They can usually be arranged on the roof of a pavilion.

Hospital Construction—Materials and Methods

Hospitals should be built of brick, either as usual or stuccoed, with foundations of concrete and roofs of slate or tile. Trimmings can be of stone or terra cotta. The interior construction should be fireproof, of steel and terra cotta or reinforced concrete. A hospital is a permanent investment and should not be subject to a serious fire hazard, to say nothing of the danger to patients. A fireproof building will stand better, have less shrinkages and resultant cracks, and should be more quiet and sound-proof. This latter condition is difficult of attainment, on account of the heat and vent ducts of metal that act as speaking tubes, conveying sound from one room to another. Walls should be water- and damp-proof, and plaster should be the hardest and best obtainable, with coves at all corners and ceiling. Floors and partitions should be thoroughly sound-proofed.

INSIDE FINISH.—The inside finish of the strictly hospital portions is now reduced to a minimum, and there is practically no finish as such. The bases are coved or "sanitary," are put in before plastering and made flush with the wall, leaving no joint or ledge to catch dust. They are usually of hard wood, filled and varnished with spar varnish to stand scrubbing; but are better of a composition that requires no varnishing. The door finish is simply a

flush rebated jamb to take the door, set, like the base, before plastering, and is thus flush also. Jambs are quite satisfactory of hard wood painted thoroughly and enamelled.

The windows have no finish and the plastering coves in to the frame all around, thus obviating a stool to catch dust and become loaded with articles.

FLOORS.—The ideal hospital floor has been the subject of more discussion and more expensive and unsatisfactory experiment than any other hospital detail. All agree with Prof. Fex that "the perfect floor is one easily kept clean, non-absorbent, fireproof, free from liability to crack, and uniform in color." I would add, of great durability and requiring the least care and expense to maintain a perfect surface. After most exhaustive experiments, by a process of elimination, he condemns all floors but those of hardburned tiles of clay. This result may be right, chemically, but practically I find no hospital superintendents who take this radical view; although tiles are quite extensively used abroad. Dr. W. O. Mann, of the Mass. Homeopathic Hospital, who has experimented extensively with various floors, has found that terrazzo is one of the cheapest and best materials. He has used the various patent composite floors, and condemns them as being unsatisfactory as to looks after a year or two of wear; as to wearing qualities, they are liable to crack, difficult to clean, etc.

In all the papers on floors, the subject is treated generally, not specifically, so that there is some liability of misunderstanding. Manifestly a floor might be very perfect and satisfactory in a kitchen or utility room that would be entirely out of place in a ward. Some of the patent floors look very well in

a ward, but look abominably after two or three years if subjected to hard wear, water, stains, etc.

WARD FLOORS.—The best ward floors, if of wood, are rock maple. Terrazzo is coming to be used extensively, and is very satisfactory in a fireproof building. Ship linoleum has been tried with great success in the Union Hospital, Fall River. It is cemented to the concrete construction and now looks as though it would be one of the cheapest and most satisfactory ward floors. Great care should be exercised in the laying, and it should be kept waxed. The Jefferson Hospital, Philadelphia, has ward and corridor floors of granolithic (cement and sand). They are wearing very well, but look stained and spotted. They can be painted with a special paint, or treated occasionally to a coat of oil and turpentine, very dilute. Maple floors should be kept thoroughly protected. The following treatment is recommended: The floor should be absolutely smooth, clean, and dry; then apply a coat or two of linseed oil diluted two thirds with turpentine, and then wax. This floor is most easily renewed and kept up, as it can have a good rubbing with "reviver," and then a coat of wax on all places showing wear, without going over the entire floor. The wax can be diluted with turpentine and rubbed to a polish.

The floors of corridors should be of linoleum, terrazzo, tile, or granolithic. This applies to a fireproof construction, but they can be used in a wood construction if properly arranged for.

The floors of diet kitchens, utility rooms, toilets, etc., should be of terrazzo. Marble (preferably Tennessee), or tiles, could be used, but at much greater cost.

The best and most durable floor for the main kitchen is slate tile. Terrazzo looks better and more sanitary, but does not wear as well. Granolithic laid in squares is more generally used, being much cheaper, and wearing quite well.

Basement floors, generally, airing balconies, porch and laundry floors, etc., should be of granolithic treated with dilute oil.

Floors in the administration portion could have a little more latitude, but should conform generally to the principles above.

All bases should be coved or "sanitary," of same material as the floor except where linoleum is used, when the base can be of wood or composite.

STAIRCASES.—Hospital staircases should be of a fireproof construction most easily kept clean. This is best accomplished by constructing them of reinforced concrete with round corners and edges, finished in terrazzo, or, if that is too expensive, in granolithic. The railings are cheapest and most easily kept clean if made of 2" iron pipe finished in aluminum-bronze.

Staircases should be at least four feet wide, enclosed to isolate and protect passage, and well lighted.

WALL TREATMENT.—It is unquestionably best to do nothing to hospital walls for two or three years, until they become thoroughly dry and all danger from cracking is over. As the walls have to be absolutely smooth for easy and successful cleansing, they must be treated with oil paint. The finish coat must be mostly oil, or have some varnish to stand scrubbing, or be of enamel. Enamel is necessary in the operating department, toilets, diet kitchens, and utility,

1908

VOUCHER REGISTER (RIGHT-HAND PAGE)

THE PRESBYTERIAN HOSPITAL in the City of New York

Voucher No.	IN FAVOR OF	Description of Voucher	Amount	Distribution	ADMINISTRATION EXPENSES					PROFESSIONAL CARE OF PATIENTS									
					Salaries, Officers and Clerks	Office Expenses	Stationery, Printing and Postage	Telephone and Telegraph Legal	Miscellaneous	Salaries and Wages	Equipment for Nurses	Apparatus and Instruments	Medical and Surgical Supplies	Alcohol, Liquors, Wines	X-RAY SERVICE	Dispensary	Emergency Ward	Visiting and Home Nursing	
	Carried Forward		903712			4045	8222	70	400		14067	33924	13764	2343		9039		51193	
3666	to Irving Fisher, Asst	Pay Roll	903356		134678			7100		300128	12060	1110			5000	36017	12630	27500	
3667	to Irving Fisher, Asst	Telephone & Telegraph	21904			2423	5145	821										11200	
3671	Allen Advertising Agency	Advertising for Employees	345			345													
3681	M. J. M. B. Lake	Group & Plan	16500																
3682	M. J. Bush & Co	Drugs	6261										4761			1500			
3688	John Barlow & Sons	Drugs	18494										9245			6687	1020	660	
3691	H. B. Blaffen Co	Chemicals & Linens	9263										7650			850			
3695	Conson Bros	Drugs	12248				12248												
3701	William G. Cullen	Dental Plates &c	2486												2486				
3705	Charles J. Davis	Surgical Instruments & Repairs	57648									41837	3240			912	717		
3711	S. Dickmann & Co	Drugs & Cils	5160																
3714	Dupont & Huot & Monette Co	Electric Wires & Repairs	4021																
3717	Marc Giditz & Son	Additions to Medical Building	230116	Additions to Buildings															
3718	Camero & Amend	Pathological Supplies &c	12821										1110						
3719	George Arnold & Co	Instrument (Surgical)	1842									1842							
3724	Julius Forl	Walter Baskets	7050																
3729	Erismoldville Mantg Co	Laundry	59374										45769			3710	9895		
3731	Chas. Haase	Groceries	1955																
3739	Samuel E. Hunter	Knives &c	30356																
3742	Johnson & Johnson	Medical Supplies	13080										7897			2303	2880		
3751	Fred. Laker	Examiner Supplies	75881													1160			
3753	Francis H. Legett & Co	Groceries	12901																
3760	Mallinckrodt Chemical Works	Drugs	3440									200	2400			620	220		
3761	Malline Co	Mattress	6000													6020			
3763	Chas. F. Matilage & Sons	Smoked Meats	15939																
3765	Mercer & Co	Drugs	9426										3953			4453	420		
3775	N.Y. Continental Jewell Filtration Co	Filters & Plan	335000	Machinery & Tools															
3777	N.Y. Telephone Co	Telephone Service	8365	Telephone & Telegraph				7965										400	
3778	Park & Tiltford	Examiner	53872																
3798	James M. Shan & Co	Glass & Glassware	12725									4460							
3803	C. R. Squibb & Sons	Drugs	6811										5011			800	700		
3805	James Stanley	Leads	28487																
3806	Stanley Supply Co	Medical Supplies & Rubber Goods	3421									330	3091						
3815	John Namamaker	Dry Goods	52823															8441	
3816	Nard & Olyphant	Coal	98926																
3818	Nelson Flagg Engineering Co	Engineer Supplies	11144																
3824	S. White Dental Mantg Co	Dental Gas	900										585			90	225		
3827	Francis J. Witte Hardware Co	Hardware & Tools	1156									85							
3829	John Wirth & Brother	Drugs	12427										1277			11150			
			3018616		134678	6813	31115	15906	400	300128	26127	83788	109253	2343	2486	84441	24557	99394	

Exhibit "C" & Superintendent's Voucher Register

but unless very much dulled or "stippled" it is too great a reflector of light for ward use. It will do well in corridors and staircases, where its reflecting qualities are valuable.

The best color for corridors, toilets, work rooms, etc., seems to be a creamy or yellowish white, to intensify the light and look cheerful and sunny. In the ward, however, if extremely well lighted, as it should be, the light should be toned down by walls of a delicate gray green that will not affect the eyes or nerves. Shades should be dark green to absorb the sunlight and darken as required. In private rooms it is well to have quiet, unobtrusive, but artistic colors on the walls, to look as homelike as possible.

DADO OR WALL PROTECTION.—Such places as have hard usage should have a dado of terrazzo, marble, or tile, for protection. This applies to the operating rooms, the sterilizing room, utility rooms, diet kitchen, and corridors of operating department. The walls of kitchen and laundry should of course be of brick, either face or enamelled. Keene's cement has also been used with good success for this purpose.

Hospital Engineering

Heating and ventilation, plumbing, laundry, lighting, elevators, lifts, cleaning systems, fitting up of kitchens, refrigeration, etc., can be here treated only in the crudest way. A careful study of these features would fill a large book and would be beyond the scope of the present work.

All special fixtures in laundry, kitchen, sterilizing room, etc., should have clear directions as to their

use framed under glass and screwed to the wall of the room to insure against lack of knowledge.

HEATING AND VENTILATION.—This very important subject is more discussed, less understood, and subject to a greater range of opinion and practice than any other. The practice varies from the natural method of direct radiation and vent ducts connected with an exhaust system, depending on fresh air from doors and windows, as in the Jefferson Hospital, Philadelphia, giving a result that certainly seems perfectly satisfactory, and is very simple and easily understood by all, to the most complicated and expensive engineering combination it is possible to imagine. Everything called "automatic" is apt to be artificial, and incomprehensible to any one except the chief engineer. Fresh air in a fairly normal condition, warmed sufficiently to be comfortable, ought to be a simple problem, but any system that precludes the possibility of opening a window, and getting it direct when you want it, seems abnormal and radically wrong. The English idea of 60° to 65° as a proper living temperature, with, of course, more blankets and warmer clothing for the nurses, seems likely to be adopted. Why not? We are all educating ourselves to sleep in rooms with no heat and the windows open, in temperatures from 60° down to nearly or quite freezing, and we sleep better, are more hungry for breakfast, have a better circulation, etc., than when we sleep in a bedroom at 70° . Why waste heat if it does harm? Dr. Ochsner of the Augustana Hospital in Chicago says direct radiation "is fairly hygienic" and calls attention to "the relatively too great expense of indirect heating" and its exceedingly unsatisfactory

character in a climate in which cold is very severe at times.

The next simple scheme of heating is the direct-indirect; that is, by radiators in the wards, with the air brought in through the wall and up under and through the radiator, with ventilation as usual in galvanized ducts into a chamber heated by a steam coil, causing an upward suction, and thence out through the roof ventilators.

The usual custom has been to place the radiators in a plenum chamber under the ward, taking the air in through galvanized iron ducts or windows and thence up through the walls into the ward, entering about eight feet above the floor, with vents at floor level as above.

The inlet should have a mixing damper operated from the ward, so that the nurse can regulate the amount of heat as required.

Radiators should be extra-spaced, smooth, hung to wall on brackets, piped into wall and not floor, all to facilitate cleansing.

The various ingenious and complicated systems making use of fans, automatic heat control, etc., are too technical for this article. My investigations have taught me that they have no place except in a great metropolitan institution, having the highest trained engineering supervision. In a number of hospitals I have found the fans not running, for one reason or another, and they, therefore, were getting practically no ventilation. It is, however, well to install an exhaust fan in each operating room to be switched on when needed.

Work rooms, diet kitchens, utility, toilets, etc., can have direct radiation, ample ventilation, and

open windows as much as possible. Corridors and all rooms for well people can have direct radiators, as we are getting over the idea that fresh air is dangerous if we feel it.

The heating plant should be installed in a separate building, with the laundry over, thus isolating the noise, dust, and odors. There should be two boilers for steam. Hot water gives an ideal heat, but is much more expensive, requiring larger pipes and radiators. High-pressure steam is needed in the laundry for mangle and sterilizing washer, also in the kitchen for cooking, in the sterilizing room, and in the aspirating coils in vent ducts; also for pumps, and, if an electric light plant is installed, it will be required for the engine and for the refrigerating plant if there is one. There should be two boilers, so that one can be run in mild weather and both during severe weather. The boiler house should be at the rear of the kitchen and service building and on a lower level, so as to return the water of condensation by gravity if possible. The piping should be covered by some insulating material, so that no heat will be wasted.

Connected with the boiler house there should be a garbage crematory and disinfecting plant.

The details of this special work can only be comprehended and worked out by an experienced heating and ventilating engineer.

FIRE PROTECTION.—It would be well to have hydrants outside and small automatic fire extinguishers inside on every floor, placed on a bracket in full sight in the corridor. Stand-pipes and hose are demanded in some cases, but are not so quick and positive in action.

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NAME *Thomson* *Herbert R.* LEDGER ACCOUNT WITH

Albert Thomaston (Father)

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101 Broadway - N.Y. City

ADMITTED	LOCATION	RATE PER DAY	DISCHARGED
10-26-68	Ward 10	5.00	11-1-68

DISCHARGED
April 7-1908

DISCHARGED
April 7-1908

[illegible]

CARD LEDGER ACCOUNT (BACK)

Plumbing

Hospital plumbing has been perfected more, possibly, than any other detail. The soil pipes are of cast iron and are usually concealed in slots in the wall. If they are carefully inspected and tested, this is safe. The water piping, hot and cold, is, in the best work, of iron-size brass pipe. If this piping is correctly installed, it is practically indestructible and, therefore, may be run in partitions. It is better to pipe to all fixtures except baths through the wall, rather than through the floor, so as to avoid the unclean floor joint. The laws and ordinances governing the installation of piping are so exacting, and vary so considerably in different localities, that they should be studied individually. There should be valves to shut off each fixture, and valves properly tagged at the foot of each line of risers in the basement.

Plumbing fixtures may be had in endless variety. Only those of greatest strength and simplicity should be used. There has been a craze for lavatories $2\frac{1}{2}$ to 3 inches away from the wall. If marble or tile walls are used; this would be well; but as walls are usually of plaster, painted or enamelled, the frequent spattering of hot water and soap soon ruins the wall, causing an unsightly and unsanitary result. On this account "integral back" fixtures are safer, cleaner and preferable. These should be of vitrified porcelain, that does not crack, craze, or wear off, and is practically indestructible, set on nickel-plated brass legs. Enamelled iron lavatories are now produced in great perfection, and are as good as the vitrified for many years.

Water closets are of many types. They should be

of vitrified porcelain with a "crescent" seat of white celluloid finish. Varnished wood is very unsanitary and never looks clean except when new. Seats might be removable, so as to be soaked and washed in hot water.

Nothing is better than an iron bath tub enamelled inside and out. Those in wards should be raised on 8" cylinder legs with sanitary coves top and bottom. They should have large double cocks, hose nozzle for spray, a large rubber plug and chain, or standing waste, either of which can be washed and is better than the expensive, complicated, concealed wastes that are always foul and cannot be cleaned.

Tubs should be set at least a foot and a half away from the wall, so that a nurse can get behind them.

Baby baths in maternity hospitals should never be installed. Babies should be washed in a small portable, or foot bath, on a low table.

The larger "baby baths" are, however, very necessary in a children's ward or in a contagious hospital, as the regular baths are too low for the nurses to use comfortably in bathing children.

Slop hoppers should be as durable as possible. The best are probably those of English manufacture. Those most generally used are of enamelled iron, which wears well in lavatory and bath, but the rough usage given to a slop hopper very soon cracks the enamel. Some hospitals use a copper hopper. This is very durable, but is it difficult to keep it polished and looking clean. Nickel plating would probably obviate this difficulty. If used for stools, there should be a large removable strainer on a chain and a piece of flexible rubber hose for washing out a bed pan.

Diet kitchen sinks are much neater and more easily kept clean if of vitrified ware or enamelled iron, with drainer of the same.

General kitchen sinks should be of cast iron, especially the deep pot sinks, and the drainers of slate for durability. These are set on strong gas-pipe legs, galvanized or aluminum-bronzed.

All sinks should be set away from the wall, or end to the wall, so that two can work at the sink at the same time, and also to facilitate cleaning.

In the toilet or utility for typhoid patients, there should be a sterilizing slop hopper of metal fitted with water and steam and a device for emptying after disinfecting.

Cocks, traps, brackets, lavatory legs, and other trimmings should be of brass, heavily nickel-plated. Polished brass has been used in many cases, but the great amount of labor involved in rubbing and polishing has caused a return to the conventional plated stock that is easily kept clean and looks sanitary. All these should be extra-heavy and of best make. Unfinished brass piping aluminum-bronzed saves work also.

Laundry

The hospital laundry should be located over the boiler house. The walls should be of brick, painted or not inside, filled with windows, and there should be a monitor on roof for light and ventilation. The floor should be of granolithic or terrazzo.

The minimum installation of fixtures seems to be:

A sterilizing washer.

A steam mangle large enough for sheets.

A centrifugal drier.

A body ironer and two or three small electric ironers.

A two- or three-rack, fireproof, drying room, with steam coils and electric fan for agitation. A soap tank. Hand ironing tables, and shelves for sorting, etc.

The floor should be drained around the washer to a catch basin trapped and drained.

All machinery to be run by electricity should be directly connected, and the washer so placed, if possible, that infected material can be put in from outside, so that it will not enter the room until disinfected.

Lighting

The ideal light for a hospital is electricity, because it does not vitiate the air by combustion and is not dangerous if properly installed. Gas has neither of these advantages and will sometimes corrode the joints of the fixtures and leak without being detected. Gas may be used for emergency lights in corridors, etc., in case of a breakdown in the electric plant. It is also well to have the kitchen piped for a gas range, the diet kitchens for gas serving tables and hot plates, and the sterilizers should be arranged for gas if high-pressure steam is impossible.

Lighting fixtures should be of the utmost simplicity, with no ornament, so as to be most easily cleaned. The best finish is dull "Flemish brass." The best fixture for general ward illumination is a globe containing a Tungsten lamp, the upper half clear glass and the lower painted with aluminum-bronze. This prevents patients from seeing the lamp and reflects

on the ceiling, and gives a soft, all-pervading light. At the head of each bed, or each pair of beds, there should be a "portable bracket," with 8 to 10 feet of cord. This will give special illumination when desired, a bedside lamp, for the use of doctors or nurses in special examinations, dressings, etc. This lamp should have a Hubbell socket and a dark green celluloid shade.

Ceiling lights should be controlled by switches at entrance. Gas emergency lights should be special short brackets with no shades. The portable bracket can be easily removed and a cord with an electric fan or a heating pad substituted as desired.

Too much light is wasted in hospitals. It is better to have individual switches, so as not to turn on more than one lamp at a time.

Elevators

The best and probably the safest hospital elevator is the automatic or push-button electric. This elevator is rather complicated in its mechanism, but, when properly installed and cared for, there is little trouble with it. By pushing an electric button the elevator comes to the floor where you are and the door is unlocked. You step in and close the door, which locks it; you push the button opposite the number of the floor you wish to visit, and the elevator goes to that floor and the door unlocks. When a door is unlocked the elevator cannot be moved, so it is absolutely safe. This type of elevator is quite expensive, costing from \$2500 to \$3000 according to conditions.

A cheaper elevator which is used in some hospitals

is the direct connected electric. This has not the complications nor the safeguards of the other, and costs about 30% less.

The car should be at least 5' 0" x 7' 0" inside to admit a wheel stretcher and should be built of steel, aluminum-bronzed, with solid plain panels below and wire above, fitted with an electric light and inlaid tile linoleum floor. Elevator doors should be single, 4' wide.

Vacuum Cleaner

It is much better to suck up the dust in a hospital than to stir it up, polluting the air and having to dust it off again.

The vacuum cleaner accomplishes wonders in this line and is an especial boon to hospitals.

One method of installation is to place the suction engine in the basement and carry pipes to each section, to which the flexible hose and nozzle can be attached.

This installation is so expensive that few hospitals have made use of it; but there are several portable cleaners operated on the same general principle, that are within the reach of every hospital.

Every vacuum cleaner system consists of the following:

- 1st, the motor.
- 2d, the suction pump.
- 3d, the filtering tank.
- 4th, the hose and nozzle.

In the first named method everything is large, complicated, and expensive, needing great power, as the pipes in the walls are very long, and the cost is

Hospital Planning, Construction, etc. 435

sometimes several thousand dollars. In the latter method the piping is eradicated and the other parts are small and easily taken from room to room, the power being obtained by plugging into any electric connection.

CHAPTER XX

HOSPITAL BOOK-KEEPING AND STATISTICS

BY FREDERIC B. MORLOK

Chief Clerk of the Presbyterian Hospital in the City of
New York

THE system of book-keeping and statistics outlined on the following pages is intended to give a clear and comprehensive knowledge as to expenditures made, revenue received, and work accomplished.

In order to keep the accounts as indicated, the following books and forms are necessary.

Books: Voucher Register, Bill Register, Cash Book, Journal, Ledger, Statistic Record.

Forms: Voucher, or Voucher Check; Pay Roll Sheet; Card Ledger Accounts with each Pay Patient; Detailed Monthly Statement of Operating, Corporation, and Other Current Expenses; Detailed Monthly Statement of Current Revenue; Detailed Monthly Statement showing Superintendent's Surplus or Deficit for Month; Detailed Monthly Statement of Statistics.

Instructions regarding Distribution of Hospital Operating and Corporation or other Current Expenses

Administration Expenses¹

1. SALARIES OF OFFICERS AND CLERKS.—This ac-

¹ Forms suitable for accounting for hospital expenses under this and the following headings will be found on pp. 374-377.

Hospital Book-keeping and Statistics 437

count includes the salaries of general officers of the hospital and their assistants or clerks whose salaries are not directly chargeable to any department. It should not include salaries of officers or clerks who are exclusively engaged with the management of the corporation, estate, or sources of revenue outside of the ordinary receipts of the hospital proper. If certain officers or clerks are partly engaged in this manner, a proper proportion of their salaries should be charged accordingly.

2. OFFICE EXPENSES.—This account includes the cost of travelling expenses of employees, car fares, express charges, messenger service, subscriptions to newspapers and periodicals, office furniture and fixtures, and such other office supplies as are not properly chargeable to any other subdivisions of Administration Expenses or to Corporation Expenses.

3. STATIONERY, PRINTING, AND POSTAGE.—This account includes the cost of printing annual reports, blank books, blank forms, paper, stationery, stationery supplies, etc., used in the general work of the hospital. It should not include expenditures of this nature made for corporation purposes.

4. TELEGRAPH AND TELEPHONE.—This account includes all expenditures account telegraph messages, rent of telephones, salaries of operators, and maintenance of telephones and telephone lines.

5. LEGAL EXPENSES.—This account includes all fees and retainers paid for services of attorneys, costs of suits, and all legal and court expenses incurred in the operation of the hospital. It should not include expenditures of this nature made for corporation purposes.

6. MISCELLANEOUS.—This account includes such

other administration expenses as are not directly chargeable to any of the foregoing accounts or to corporation expenses.

Professional Care of Patients

7. SALARIES AND WAGES.—This amount includes the salaries and wages of employees under the various headings named.

8. EQUIPMENT FOR NURSES.

This account includes the cost of uniforms, books, and instruments, if furnished to the nurses by the hospital. If uniforms, books, and instruments are purchased by the hospital, to be paid for later by the nurses, they should be charged to the General Material Account, and that account should be credited when these are paid for by the nurses.

9. MEDICAL AND SURGICAL SUPPLIES.—This account includes the cost of apparatus and instruments, medical and surgical supplies, and alcohol, liquors, wines, etc., purchased for the general use of the hospital, not specifically chargeable to any department. It would not, however, include the purchase of apparatus and instruments in large quantities to equip new and additional buildings, which should be charged to Capital Account, under the heading provided therefor.

10. DISPENSARY.—(a) Salaries and Labor. This account includes the salaries and wages of physicians, assistants, nurses, and any other employees in this department. (b) Supplies. This account includes the cost of all apparatus and instruments, medical and surgical supplies, and any other supplies whatsoever, which are properly chargeable to this department.

Hospital Book-keeping and Statistics 439

11. EMERGENCY WARD.—(a) Salaries and Labor. This account includes the salaries and wages of physicians, assistants, nurses, and any other employees in this department. (b) Supplies. This account includes the cost of all apparatus and instruments, medical and surgical supplies, and any other supplies whatsoever, which are properly chargeable to this department.

12. VISITING OR HOME (DISTRICT) NURSING.—(a) Salaries. This account includes the salaries of nurses employed in this service. (b) Supplies. This account includes the cost of all medical and surgical supplies, food, clothing, or any other supplies whatsoever purchased for this service for use of patients.

13. X-RAY SERVICE.—(a) Salaries and Labor. This account includes the salaries and wages of physicians, operators, and any other employees in this service. (b) Supplies. This account includes the cost of apparatus and supplies which are properly chargeable to this service.

Department Expenses

14. AMBULANCE.—(a) Labor. This account includes the wages of all employees in this department; also the cost of any other labor in connection with making repairs or maintaining the equipment of this department. (b) Supplies. This account includes the cost of all equipment and supplies of any nature which are properly chargeable to this department; also, the cost of any material used in making repairs or maintaining the equipment of this department. It should not include, however, new and additional equipment, such as ambulances, live stock, etc.

It is considered more proper to charge such new equipment to Capital Account, under the heading provided therefor.

15. PATHOLOGICAL LABORATORY.—(a) Salaries and Labor. This account includes the salaries and wages of physicians, assistants, and any other employees in this department, including amounts paid for cost of labor in making repairs or maintaining the equipment of this department. (b) Supplies. This account includes the cost of all apparatus and instruments, medical and surgical supplies, and any other supplies whatsoever, which are properly chargeable to this department; also, the cost of any materials used in making repairs or maintaining the equipment of this department.

16. TRAINING SCHOOL.—(a) Salaries and Labor. This account includes the salaries and wages of officers, instructors, and any other employees which are chargeable exclusively to the cost of operating and maintaining the training school, and which can not properly be charged to any other account. (b) Supplies. This account includes the cost of supplies and materials which are directly chargeable to the cost of operating and maintaining the training school exclusively, but does not include the cost of supplies for housekeeping, kitchen, laundry, steward's department, and general house and property expenses in connection with the training school, which should be charged under their respective headings elsewhere, together with other expenses of similar character for the general hospital, as it does not seem desirable to further subdivide the training school account.

17. HOUSEKEEPING.—(a) Labor. This account includes the salaries and wages of the housekeeper and

THE PRESBYTERIAN HOSPITAL IN THE CITY OF NEW YORK.

BILL REGISTER,

SUMMARY OF ACCOUNTS OF Maid and Nurse PAY PATIENTS AND OTHER HOSPITAL RECEIPTS, FOR MONTH ENDING March 31, 1908

[illegible]

Hospital Book-keeping and Statistics 441

all persons employed in this department, including waitresses, chambermaids, scrubwomen, porters, etc.; also, all persons employed in making and maintaining housekeeping supplies and in cleaning, etc., chargeable to the general hospital and training school, and not chargeable to any other department. (b) Supplies. This account includes the cost of furniture and fixtures, such as beds, bedding, chairs, tables, tableware, linen, and all other housekeeping supplies. It also includes the repairs of same. It should not include, however, large quantities of new and additional furniture. It is considered more proper to charge these to Capital Account, under the heading provided therefor.

18. KITCHEN.—(a) Labor. This account includes wages and labor of all persons employed in this department, in connection with the preparation and general distribution of all food. (b) Supplies. This account includes the cost of all kitchen utensils, fuel used in the kitchen range, and other supplies and materials chargeable to the operation and maintenance of the kitchen; not including, however, provisions mentioned under the heading of Steward's Department.

19. LAUNDRY.—(a) Labor. This account includes the wages of employees engaged in this department or the cost of laundry work done outside. It also includes the cost of any labor in connection with repairs or maintenance of equipment of this department. (b) Supplies. This account includes the cost of all supplies used in this department, including the materials used in connection with operating and maintaining the equipment of this department.

20. STEWARD'S DEPARTMENT.—(a) Labor. This

account includes the wages of all persons employed in receiving, storing, and distributing the supplies of this department. (b) Provisions. Bread.—This account includes the cost of all bread, cake, pastry, etc., purchased. Milk and Cream.—This account includes the cost of all milk, cream, cheese, and ice-cream purchased. Groceries.—This account includes the cost of all groceries, canned goods, flour, dried fruit, etc. Butter and Eggs.—This account includes the cost of all butter and eggs. Fruits and Vegetables.—This account includes the cost of all fresh fruits and fresh vegetables. Meat, Poultry and Fish.—This account includes the cost of all meat, whether fresh, dried or smoked, and of poultry, game, fish, and all sea food.

General House and Property Expenses

21. ELECTRIC LIGHTING.—This account includes the cost of all labor, supplies, and materials used in connection with operating and maintaining the electric lighting plant, not including, however, the cost of maintaining machinery used in connection with same, which is chargeable to Maintenance, Machinery, and Tools. It includes the cost of maintaining electric lamps, fixtures or wiring, but does not include the cost of operating steam plant or dynamos, which is chargeable to Maintenance, Machinery and Tools. This account of electric lighting includes the cost of any electric light if furnished from outside.

22. FUEL, OIL, AND WASTE.—This account includes the cost of all fuel, oil, and waste used in connection with operating and maintaining the power, lighting, and heating plant, but does not

Hospital Book-keeping and Statistics 443

include the cost of fuel used in the kitchen or laundry range.

23. GAS.—This account includes the cost of all gas.

24. ICE.—This account includes the cost of all ice. (If refrigerating plant is used, indicate by footnote.)

25. MAINTENANCE, REAL ESTATE AND BUILDINGS.—This account includes the cost of all labor and materials used in connection with repairs and maintenance of real estate and buildings in the hospital group. It includes the cost of repairs to fences, sidewalks, and the cost of keeping sidewalks and grounds in good order, shovelling snow, etc. This account should not be charged with repairs and renewals of furniture and fixtures such as beds, bedding, chairs, tables, tableware, etc., which are chargeable to House-keeping Supplies; nor does it include the cost of new and additional real estate and buildings. It is thought more proper to charge the cost of these to Capital Account, under the headings provided for sites and grounds or buildings.

26. MAINTENANCE, MACHINERY AND TOOLS.—This account includes the cost of all labor or materials used in connection with repairs, maintenance and renewals of boilers, stationary engines, dynamos, pumps, and other machinery, including the shafting, belting, and other appliances for running machinery and all tools and fixtures used in connection therewith.

It includes the wages of engineers, firemen, etc., not directly chargeable to other accounts. It should not include the cost of machinery for new buildings. It is considered that this is more properly chargeable to this heading under Capital Account.

27. **PLUMBING AND STEAMFITTING.**—This account includes the cost of all labor and materials used in connection with repairs, and renewals of all water, gas or steam pipes, and fittings.

28. **RENT.**—This account includes the cost of rental of buildings used in connection with hospital work.

29. **INSURANCE.**—This account includes the cost of all insurance for account of the hospital.

30. **MISCELLANEOUS.**—This account includes the cost of any labor and materials chargeable to general house and property expenses, not included in any of the headings already provided for.

Corporation Expenses

31. **SALARIES OF OFFICERS AND CLERKS.**—This account includes salaries of officers and clerks who are exclusively engaged with the management of the corporation, estate, or other sources of revenue outside of the ordinary receipts of the hospital proper.

If certain officers or clerks are partly engaged in this manner a proper proportion of their salaries should be charged accordingly.

32. **STATIONERY, PRINTING, AND POSTAGE.**—This account includes expenditures of this nature for corporation purposes, including cost of soliciting donations, etc.

33. **LEGAL EXPENSES.**—This account includes expenditures of this nature made for corporation purposes.

34. **INTEREST ON MORTGAGES AND LOANS PAYABLE.**—This heading explains itself.

35. **TAXES.**—This account includes all taxes, if any, paid on property used for hospital purposes.

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Taxes paid on property held for investment and not used for hospital purposes should be debited to income, if any, from such investment. If there is no income from such investment, these expenses should be debited to the capital account of such investment.

36. MISCELLANEOUS.—To this account should be charged any other corporation expenses not properly chargeable to any of the other headings provided, including petty current expenses paid on account of investments.

Other than petty current expenses paid on property held for investment and not used for hospital purposes should be debited to income, if any, from such investment. If there is no income from such investment, these expenses should be debited to the capital account of such investment.

37. CURRENT EXPENSES FROM SPECIAL FUNDS FOR STATED PURPOSES.—(Show expenditure from each fund separately.) This account explains itself.

Capital Expenditures

(a) ADDITIONS TO SITES AND GROUNDS.—This account includes the cost of acquiring new and additional sites or grounds to be used for hospital purposes only.

(b) ADDITIONS AND BETTERMENTS, BUILDINGS.—This account includes the cost of erecting new buildings to be used for hospital purposes only. It would also include the cost of extensive alterations or repairs, such as adding to the height of, or any improvement to, the building proper. It would not include the cost of painting old buildings, or making minor repairs, as such costs should be charged to "Maintenance, Real

Estate, and Buildings" account, under General Operating Expenses.

(c) FURNITURE AND FIXTURES.—This account includes the cost of new or additional furniture and fixtures if purchased in large quantities, as would be the case in opening a new ward or building. It would not include the cost of repairing any furniture or fixture, as such cost should be charged to "Housekeeping" account, or "Maintenance, Real Estate and Buildings," account, under General Operating Expenses.

(d) NEW MACHINERY AND TOOLS.—This account includes the cost of new and additional machinery and tools, such as installing new boilers, stationary engines, dynamos, pumps, or other machinery in old buildings or equipping new buildings. It would not include the cost of repairing existing machinery and tools, as such cost should be charged to "Maintenance, Machinery, and Tools" account, under General Operating Expenses.

(e) APPARATUS AND INSTRUMENTS.—This account includes the cost of apparatus or instruments purchased in large quantities, as would be the case in opening a new ward, operating room, or building. It would not include the cost of repairing apparatus or instruments, as such cost should be charged to "Apparatus and Instruments" account, under General Operating Expenses.

(f) AMBULANCE, LIVE STOCK, ETC.—This account includes the cost of the new or additional ambulances or live stock, as would be the case in increasing the service. It would also include the cost of changing the ambulance from horse to motor power. It would not include the cost of replacing any vehicle, or animal,

Hospital Book-keeping and Statistics 447

as such should be charged to "Ambulance" account, under General Operating Expenses.

(g) MISCELLANEOUS.—This equipment includes the cost of any new and additional equipment of any kind in large quantities, not chargeable to any of the other accounts, making up Capital Expenditures.

NOTE.—In the event of erecting a new building to take the place of an old building which had been torn down, the value of the old building should be credited on the treasurer's books, and the cost of the new building charged to the Capital Account. Likewise, in purchasing new "Furniture or Fixtures," "Machinery and Tools," or "Apparatus and Instruments" in large quantities to replace old or worn out articles, the proper valuation of the articles replaced should be credited to the proper account on the treasurer's books, and the cost of the new articles charged to "Capital Account."

However, in replacing individual articles occasionally, and if the value is small, the cost should be charged to the proper account under "General Operating Expenses."

Printed forms like these which follow may conveniently be employed in accounting:

Detailed Monthly Statement of Operating, Corporation, and Other Current Expenses

ADMINISTRATION EXPENSES

Salaries, Officers and Clerks.....	.....	..
Office Expenses.....	.....	..
Stationery, Printing, and Postage.....	.....	..

Telephone and Telegraph.....	.....	..
Legal Expenses.....	.....	..
Miscellaneous.....	.....	..

Total Administration Expenses.....
------------------------------------	-------	----

PROFESSIONAL CARE OF PATIENTS

Salaries and Wages:

Physicians.....	.....	..
Supt. of Nurses, Assistant, and Instructors .....	.....	..
Nurses.....	.....	..
Special Nurses.....	.....	..
Orderlies.....	.....	..
Special Orderlies.....	.....	..
Ward Employees.....	.....	..

Equipment for Nurses:

Uniforms.....	.....	..
Books.....	.....	..
Instruments.....	.....	..

Medical and Surgical Supplies:

Apparatus and Instruments.....	.....	..
Medical and Surgical Supplies.....	.....	..
Alcohol, Liquors, Wines, etc.....	.....	..

Dispensary:	Salaries and Labor.....	.....	..
	Supplies.....	.....	..

Emergency Ward:	Salaries and Labor.....	.....	..
	Supplies.....	.....	..

Visiting and Home:	Salaries.....
--------------------	---------------	-------	----

(District) Nursing:	Supplies.....
---------------------	---------------	-------	----

X-Ray Service:	Salaries and Labor.....	.....	..
	Supplies.....	.....	..

Total Professional Care of Patients..
---------------------------------------	-------	----

DEPARTMENT EXPENSES

Ambulance:	Labor.....	.....	..
	Supplies.....	.....	..

Pathological	Salaries and Labor.....	.....	..
Laboratory:	Supplies.....	.....	..

66 Exhibit 'F' - < Superintendent's Cash Book >

67

THE PRESBYTERIAN HOSPITAL in the City of New York.

Cash for the Month of March

1908

Cr.

DATE 1908	FROM WHOM RECEIVED	Patient Number	CASH RECEIVED ACCOUNT HOSPITAL EARNINGS					DATE 1908	TO, WHOM PAID	ACCOUNT OF	Voucher or Patient Number	VOUCHERS PAID	Overpayments by Patients Refunded	Miscellaneous
			Private Room Patients	Ward Pay Patients	Dispensary	Emergency Ward	Other							
	Carried Forward		324215	285965	72545	14318	8417		Carried Forward			1095797	20520	600000
March 30	Charles Foster	512		7285				March 13	United Dressed Beef Co		3651	98268		
	Mary Simon	621		2100					Napoli Electric Controller Co		3652	30		
	Nellie Jackson	528		1350					Nat'l & Elephant		3653	103789		
	M. T. S. Thorne, Treasurer	✓							John B. Watkins Co		3654	125		
	Pharmacy	✓					70		Necker & Son		3655	150		
	Dispensary	✓			3865				A. A. Neeks Hoskins Co		3656	210		
	Ellen Hudson	620		1000					Whitall Tatum Co		3658	7810		
	Emergency Ward	✓				1225			Mrs. R. E. Whiteley		3659	1500		
	Harrison Heath	623		2100					S. S. White Dental Mfg Co		3660	1800		
31	Oil Barrels Sold	✓					225		Wingfield & Taylor Co		3661	19900		
	William E. Babcock	624		7950					Chas. Wissmann Co		3662	16186		
	Arthur G. Bentley	118	35000						Francis J. Little Hardware Co		3663	1872		
	Nellie L. Kruppgerman	147	8700					18	William Rankin	Louise Rankin	552		720	
	Emily Barnett	625		1000					Anna Haggerty		522		600	
	John Anderson	492		1050					Ludwig Kohn	Helen Kohn	520		1200	
	Christian H. Forrell	577		1350				20	Florence J. Welch		580		1650	
	Louis Schefer	561		300				21	Colletta Nelson		571		600	
	Woronz Hussler	128	3000					23	Ellen O'Donough		549		1175	
	Emergency Ward	✓				230		24	Isella Knowles	Eleanor Porter	584		500	
	Pharmacy	✓					120	30	M. T. S. Thorne, Treasurer		✓			450000
	Dispensary	✓			2460			31	G. Irving Fisher, Supt.	Pay Roll	3666	903356		
	General Material Sold	✓					2328		A. Leon McArthur		587		1150	
	Telephone Tolls Received	✓					1100		Cash on hand end of month					146043
			370915	311450	79870	15773	12260					2250893	28095	1196043
	Recapitulation - March, 1908								Recapitulation - March, 1908					
Ledger Folio	Cash on hand at first of Month							Ledger Folio	68	Vouchers Paid during Month				2250893
	Cash received, Private Room Patients						370915	116	Overpayments by Patients Refunded during Month					28095
	Ward Pay Patients						311450	42	Cash Remitted to Treasurer during Month					1050000
	Dispensary						79870		Cash on hand at end of Month					146043
	Emergency Ward						15773							
	Other Hospital Earnings						12260							
33	Total Cash received during Month account Hospital Earnings						790268							
42	Cash received from Treasurer during Month						2284483							
							3475031							3475031

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Training School:	Salaries and Labor.....
	Supplies.....
Housekeeping:	Labor.....
	Supplies.....
Kitchen:	Labor.....	.....	..
	Supplies.....	.....	..
Laundry:	Labor.....	.....	..
	Supplies.....	.....	..

Steward's Department:

Labor.....	.....	..
Provisions:		
Bread.....	.....	..
Milk and Cream.....	.....	..
Groceries.....	.....	..
Butter and Eggs .....	.....	..
Fruits and Vegetables.....	.....	..
Meat, Poultry, and Fish.....	.....	..
	<hr/>	<hr/>
Total Steward's Department.....	.....	..
	<hr/>	<hr/>
Total Department Expenses.....	.....	..

GENERAL HOUSE AND PROPERTY EXPENSES

Electric Lighting.....	.....	..
Fuel, Oil, and Waste.....	.....	..
Gas.....	.....	..
Ice.....	.....	..
Insurance.....	.....	..
Maintenance, Real Estate, and Buildings....	.....	..
Maintenance, Machinery, and Tools.....	.....	..
Plumbing and Steam-fitting:.....	.....	..
Rent.....	.....	..
Miscellaneous.....	.....	..
	<hr/>	<hr/>
Total General House and Property Ex- penses.....	.....	..
	<hr/>	<hr/>
Total Operating Expenses .....	.....	..

CORPORATION EXPENSES

Salaries, Officers and Clerks.....	.....	..
Stationery, Printing, and Postage.....	.....	..
Legal Expenses.....	.....	..
Interest on Mortgages or Loans Payable.....	.....	..
Taxes.....	.....	..
Miscellaneous.....	.....	..
	<hr/>	<hr/>
Total Corporation Expenses.....	.....	..

CURRENT EXPENSES FROM SPECIAL FUNDS FOR STATED PURPOSES

(Show expenditure from each fund separately.)

Grand Total Current Expenses.....	.....	..
Excess of Current Revenue over Current Ex-		
penses.....	.....	..
	<hr/>	<hr/>
Total.....	.....	..

If the preceding detailed statement of operating, corporation, and other current expenses, also the detailed statement of current revenue, as described on pages 426-432, is prepared monthly, it will be a simple matter at the end of twelve months to add together the twelve monthly totals of each item, and thus have a complete yearly report ready for publication.

Likewise, if the detailed statement showing the superintendent's monthly surplus or deficit, as described on a following page, is prepared monthly, it will be a simple matter at the end of twelve months to add together the twelve monthly totals of each item, and thus have a complete yearly report showing a surplus or deficit.

Hospital Book-keeping and Statistics 451

Detailed Monthly Statement of Current Revenue

HOSPITAL EARNINGS (OR OPERATING EARNINGS)

Private Room Patients.....	.....	..
Board of Friends of Patients.....	.....	..
Ward Pay Patients.....	.....	..
Special Nursing.....	.....	..
Dispensary.....	.....	..
Emergency Ward.....	.....	..
Ambulance Fees.....	.....	..
Miscellaneous.....	.....	..
	<hr/>	<hr/>
Total Hospital Earnings.....	.....	..

OTHER REVENUE OR INCOME

From the Public Treasury.....	.....	..
* Donations from Individuals to meet Current Expenses.....	.....	..
Donations from Churches to meet Current Expenses.....	.....	..
From Hospital Saturday and Sunday Association.....	.....	..
Net Receipts from Entertainments, Fairs, Fêtes, etc.....	.....	..
*Legacies, unrestricted.....	.....	..
Income from Investments held in Endowed Bed Fund.....	.....	..
Income from Investments held in General Endowment Fund.....	.....	..
Income from Investments held in other Funds, (enumerate) the income of which is to be used to meet Operating Expenses and is not to be added to the principal.....	.....	..
Income from Unrestricted Investments....	.....	..
Miscellaneous.....	.....	..
	<hr/>	<hr/>
Total other Revenue or Income.....	.....	..

APPROPRIATIONS FROM SPECIAL FUNDS TO MEET CURRENT EXPENSES

(Show appropriation from each fund separately.)

.....
.....
.....
.....
<hr/>		
Total Appropriations from Special Funds to meet Current Expenses.....	.....	..
<hr/>		
Grand Total Current Revenue.....	.....	..
Excess of Current Expenses over Current Revenue.....	.....	..
<hr/>		
Total.....	.....	..

* The amounts shown for Unrestricted Donations or Legacies should include the value of investments (not including accrued interest) given to the Hospital without restriction.

In order to enable the superintendent to compile the above statement, it is customary for the treasurer to forward to the superintendent the information in regard to "Other Revenue or Income," as shown by the treasurer's books.

Detailed Monthly Statement showing the Superintendent's Surplus or Deficit

Debit Side		
Capital Expenditures:		
Additions to Sites and Grounds.....
Additions and Betterments, Buildings..

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Furniture and Fixtures.....
New Machinery and Tools.....
Apparatus and Instruments.....
Ambulance, Live Stock, etc.....	.....	..
Miscellaneous.....	.....	..
Total Capital Expenditures.....	.....	..
Grand Total Current Expenses.....	.....	..
Uncollectable Superintendent's Accounts Re- ceivable charged off.....	.....	..
Loss or Depreciation of General Material charged off.....	.....	..
Total.....	.....	..
Surplus for Month.....	.....	..
*Total.....	.....	..
Credit Side		
Grand Total Current Revenue.....	.....	..
Surplus amount of General Material found by inventory to be on hand. . . . .	.....	..
Total.....	.....	..
Deficit for month.....	.....	..
*Total.....	.....	..

* These Totals should agree.

Vouchers

Vouchers are used for convenience to provide a uniform size and kind of blank on which to describe each respective bill, as illustrated on Exhibit A. They also bear suitable certificates for clerks and officials to sign, stating that all extensions, additions, and calculations in the account have been examined

and found correct, and that the account has been properly entered on the books and has not been previously entered or paid, and also that the account is correct and has been incurred for the benefit of the hospital. Provision is also made so that the party in whose favor a voucher is made may sign his receipt thereon of the amount called for by the voucher.

On the back of each voucher it is found convenient to print all of the headings adopted in the classification of expenses, to which any expense paid by voucher might be charged, not including pay-roll expenses, as a similar provision can be made on the back of some of the pay-roll sheets, so that distribution of pay-rolls to the proper headings can be recorded on the back of the last sheet of the monthly pay-roll in the same way as the pay-roll is treated as one voucher.

A clear record may thus be kept on each voucher and in a Voucher Register, showing to what account or accounts each voucher has been charged. Vouchers should be consecutively numbered, to correspond with number given in Voucher Register. After being paid, they should be filed for reference in consecutive order, so they may be easily referred to if desired.

Pay-Rolls

A sample pay-roll sheet is illustrated on Exhibit B. The distribution of pay-roll expenses is printed on the back of a small percentage of the pay-roll sheets, as this distribution need be shown only on the last sheet of the monthly pay-roll, from which the expenses chargeable to each account can be posted to the Voucher Register, as is done in the case of other vouchers. The pay-roll is paid in cash, and is treated

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as one voucher. The superintendent draws this cash by voucher in favor of himself from remittances made to him by the treasurer. This voucher is later attached to the receipted pay-roll and presented to the proper authority for approval.

Time Checks

In case employees leave the service of the hospital and it is desired to pay them their salary or wages before the regular monthly pay-roll is made up, time checks in the following form are issued and properly certified, and a record of same is kept on a stub as indicated.

No.....190	No.....
Favor of.....	(Insert Name of Hospital)
Occupation.....	Time Check—Not Negotiable
Days.....	New York,.....190..
Rate.....	This certifies, That....employed as
	.....has worked....days in month
	of.....190... at \$..... per
	....., and is entitled to
	.....dollars and.....cents.
	Received payment
	in full,
	Time given has
	been noted in Time
	Book opposite name
Amount \$.....	.....

Issued by.....	Witness.....
	Amount \$.....

When such time checks are receipted by the parties in whose favor they are made and presented for payment, they are paid in cash. When the pay-roll is made up, records of time checks issued are noted thereon, and receipted time checks are filed with receipted pay-rolls.

Voucher Register

In order to avoid making separate entries to general ledger accounts for each individual expense incurred, and so that entries need be made for the totals only at the end of each month, and to economize time and labor in recapitulating results, a Voucher Register is used with headings properly arranged in separate columns to correspond closely with the classifications of expenses agreed upon, as illustrated on Exhibit C.

If there are apt to be only a few bills per month for any one subdivision of expenses, it is not necessary to have a separate column for each subdivision, but it may be grouped with some other expenses under the proper general heading and in a vertical column headed Distribution. The subdivision to which it belongs can be indicated on the same line.

For a small hospital, for example, all administration expenses may be entered in one vertical column headed Administration Expenses, and in the column headed Distribution; the subdivision or subdivisions of Administration Expenses to which any vouchers are chargeable may be designated. In such cases, where the monthly entries in any one column are not very numerous, it would not be difficult, at the end of each month, to recapitulate the total amounts chargeable to each subdivision of expenses.

After all the vouchers for the month have been entered upon the Voucher Register, it is then a simple matter to make the necessary footings and recapitulation, so as to show the total expenses for each and all of the different subdivisions called for by the classification of expenses. A recapitulation in about the following form should be made:

Hospital Book-keeping and Statistics 457

Grand Total Current Expenses.....	.....	..
Total Capital Expenditures.....	.....	..
General Material Purchased.....	.....	..
	<hr/>	<hr/>
Total Vouchers Registered.....	.....	..

“Grand Total Current Expenses” and “Total Capital Expenditures” are debited direct to “Superintendent’s Account with Treasurer” on the Ledger, and “General Material Purchased” is debited direct to “General Material Account” on the Ledger, and “Total Vouchers Registered” is credited direct to “Voucher Account” on the Ledger.

Proper references are made on the Voucher Register in each case to the pages of the Ledger to which postings are made.

Card Ledger Accounts with each Pay Patient.

In order to keep proper records of amounts due and amounts paid, a card ledger account is kept with each pay patient on a card illustrated on Exhibit D. On these cards pay patients are numbered consecutively, beginning with No. 1, the first of each fiscal year, for reference, and so that by these numbers it is easy to see how many pay patients are admitted during the year.

On a separate card for each pay patient are shown the amounts due from him for board and attendance, special nursing, telephone messages, and other miscellaneous expenses incurred for his account, and total amount due accruing during each month. Payments received for accounts of pay patients are entered at once on the Cash Book, from which they are posted daily to the proper patient’s card ledger account in the column provided therefor.

At the end of each month, when all the amounts due from each patient for such month, and all of the amounts paid by each patient during such month, have been entered on their respective card, the information called for by the headings shown on the back of each card can then be posted in the proper column or columns, namely:

"Accounts Receivable of previous months paid during month."

"Advance Payments by Patient during month."

"Overpayments by Patient during month."

"Accounts Receivable accruing during month."

"Amount Due accruing during month or Overpayments by Patients paid by Advance Payments of previous months."

On these cards the totals of all figures for any one month, which may be entered in any of the columns headed—

"Total Amount due accruing during month."

"Accounts Receivable of previous months paid during month,"

"Advance Payments by Patients during month,"

"Overpayments by Patients during month—"

must equal the totals of all figures for the same month which may be entered in any of the columns headed—

"Total Cash Payments received during month."

"Accounts Receivable accruing during month."

"Amounts Due accruing during month or Overpayments by Patient paid by Advance Payments of previous months."

At the end of each month the figures for such month from each of these card ledger accounts are then entered upon a Bill Register described below, for

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the purpose of securing the totals of all such accounts.

The figures, if any, showing "Overpayments by Patients refunded during month" are posted direct from the Cash Book to the cards in the column bearing that heading, in order to complete the record on that card, but it is not necessary to enter these figures on the Bill Register, as "Overpayments by Patients refunded during month" are debited direct from the Cash Book to the Ledger account "Overpayments by Patients," as shown later.

The following paragraphs will explain just what is meant by "Advance Payments by Patients" and "Overpayments by Patients."

"Advance Payments by Patients" are payments made by them for care or services, etc., to be rendered during some succeeding month.

"Overpayments by Patients" are payments made by patients for services or care, etc., never rendered. As the hospital offers to refund these "overpayments" to patients concerned, when they leave the hospital, and as they are liable to be claimed by such patients at any time, the amount to the credit of "Overpayments by Patients" account is carried as a liability of the hospital on the Ledger. From time to time under authority of the proper official—generally the treasurer of the hospital—a part of the amount standing to the credit of "Overpayment by Patients Account," which represents overpayments which have not been claimed for a long time, and which will probably not be claimed, is transferred by journal entry, No. 2, as indicated, to "Miscellaneous Hospital Earnings."

Bill Register

At the end of each month a recapitulation of the card ledger accounts of all pay patients is made in the Bill Register, a sample page of which is shown on Exhibit E. In recapitulating the accounts of pay patients, the accounts of private room patients are entered together and totaled, and the accounts for ward pay patients are entered together and totaled. In this way the totals in the columns on the Bill Register headed "Cash Payments received during month," as regards private room patients and as regards ward pay patients, can be checked with similar totals shown on the Cash Book at the end of the month, with which they must agree if postings have been properly made. The total earnings and cash receipts for the month from the dispensary, emergency ward, X-ray service, sale of junk, telephone tolls, and other miscellaneous hospital earnings, are likewise posted in detail on the Bill Register at the end of each month.

The amount due for, and cash received for, General Material sold during month, figured at cost price (profit, if any, on sales of general material being credited to Miscellaneous Hospital Earnings), is likewise posted on the Bill Register.

If these entries for each month are correctly made on the Bill Register in the columns provided therefor, the combined total of the total figures shown in the four columns headed—

"Total Amount Due accruing during month,"

"Accounts Receivable of previous months paid during month,"

"Advance Payments by Patients during month "

“Overpayments by Patients during month—”
must equal the combined total of the totals shown in the three columns headed—

“Total Cash Payments received during month,”

“Accounts Receivable accruing during month,”

“Amounts Due Accruing during month or Overpayments by Patients paid by Advance Payments of previous months.”

After all entries for the month are made on the Bill Register, a recapitulation is made in about the following form.

Total Amount Due accruing during month (Hospital Earnings)....	.....	..
Cost Price General Material Sold during month.....	.....	..
Accounts Receivable of previous months paid during month....	.....	..
Advance Payments by Patients during month.....	.....	..
Overpayments by Patients during month.....	.....	..
Total Cash Payments Received during Month (should check with Cash Book).....	.....	..
Accounts Receivable accruing during month.....	.....	..
Accounts Due accruing during month, or Overpayments paid by Advance Payments of previous months.....	.....	..
Totals (which must agree).....	.....	..

“Total Amount Due accruing during month” (Hospital Earnings) is debited to “Bill Account” and credited to “Superintendent’s Account with Treasurer” on the Ledger, and

"Cost Price of General Material Sold during month" is debited to "Bill Account" and credited to "General Material Account" on the Ledger, and

"Advance Payments by Patients during month" is debited to "Bill Account" and credited to "Advance Payments by Patients Account" on the Ledger, and

"Overpayments by Patients during month" is debited to "Bill Account" and credited to "Overpayments by Patients Account" on the Ledger, and

"Amount Due accruing during month, or Overpayments paid by Advance Payments of previous months" is debited to "Advance Payments by Patients Account" and credited to "Bill Account" on the Ledger.

"Total Cash Payments received during month," as shown by the Bill Register, should agree with cash received during month in payment of bills rendered patients and including Dispensary, Emergency Ward, and Other Miscellaneous receipts account Hospital Earnings and Cash Received account General Material Sold, as shown in the recapitulation at the end of each month in the Cash Book described later.

These total cash payments received during month account Hospital Earnings are credited direct from the Cash Book to "Bill Account" on the General Ledger, as indicated later, and it is, therefore, not necessary to post this item from the Bill Register.

It is not necessary to post from the Bill Register totals in the columns headed—

"Accounts Receivable of previous months paid during month," and

"Accounts Receivable accruing during month—" as the amount of "Accounts Receivable of previous

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months paid during month" is already included in "Total Cash Payments received during month," and the amount of "Accounts Receivable accruing during month" is already included in "Total Amount Due accruing during month" referred to above.

Reference should be made on the Bill Register to the pages of the Ledger on which each total is posted.

From the totals shown in the first four columns of the Bill Register, the superintendent secures the necessary information to show the amount of Hospital Earnings for each month.

Cash Book

In order to avoid making separate entries to general ledger accounts for each item of cash received or cash paid out, a Cash Book is used with headings arranged to economize time and labor in recapitulating totals, so as to readily show total cash receipts and expenditures for each month, under the desired classifications. A sample page of the Cash Book is shown on Exhibit F.

The total amount of cash on hand at first of month plus the cash received during month, as shown on the debit side of the Cash Book, less the total amount of cash paid out during month, as shown on the credit side of the Cash Book, will indicate at any time the amount of cash that should be in the hands of the superintendent.

At the end of each month a recapitulation of the total amount of cash received during the month should be made on the debit side of the Cash Book in about the following form:

Cash on hand at first of month.....	.....	..
Cash Received During month ac- count Hospital Earnings:		
From Private Room Patients.. .....	.....	..
From Ward Pay Patients.....	.....	..
From Dispensary.....	.....	..
From Emergency Ward.....	.....	..
From Other Miscellaneous Hos- pital Earnings.....	.....	..
Total cash received during month account Hospital Earnings....	.....	..
Cash Received from Treasurer dur- ing month.....	.....	..
	<hr/>	<hr/>
*Total.....	.....	..

At the end of each month a recapitulation of the total amount of cash paid out during the month should be made on the credit side of the Cash Book, in about the following form:

Vouchers paid during month.....	.....	..
Cash refunded to Patients during month ac- count "Overpayments by Patients" for care or services never rendered and not to be rendered.....	.....	..
Cash received during month in payment of bills rendered Patients and including Dis- pensary, Emergency Ward, and other Miscellaneous receipts, account Hospital Earnings or account General Material Sold, and remitted to Treasurer during month	.....	..
Cash on hand at end of month.....	.....	..
	<hr/>	<hr/>
*Total.....	.....	..

It is not customary for the superintendent to remit

*These totals should agree.

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to the treasurer cash received account "Advance Payments by Patients" during month for services to be rendered in succeeding months, or "Overpayments by Patients" for care or services never rendered, until such accounts are finally disposed of in the manner indicated.

The cash in the hands of the superintendent includes the amount of "Advance Payments by Patients" and "Overpayments by Patients," for which he is chargeable at any time.

If these above-mentioned totals are recapitulated at the end of each month on the Cash Book, this Cash Book can be considered as the cash ledger account, and there will be no necessity of carrying a cash account on the Ledger in addition.

The total "Cash Received during month account Hospital Earnings," as shown on the debit side of the Cash Book, is credited direct at the end of the month to "Bill Account" on the Ledger, and

"Cash received from Treasurer during month" is credited direct to "Superintendent's Account with Treasurer" on the Ledger, and

The total "Vouchers Paid during month," as shown on the credit side of the Cash Book, is debited direct at the end of the month to "Voucher Account" on the Ledger, and

"Cash received during month account Hospital Earnings and General Material sold, and remitted to Treasurer during month," is debited direct to "Superintendent's Account with Treasurer."

Proper references are made on the Cash Book in each case to the pages of the Ledger to which postings are made.

Journal

As will be seen from the preceding paragraphs, practically all entries made in the general ledger accounts are posted direct from the Voucher Register, Bill Register, or Cash Book. In order, however, to indicate to what ledger accounts items not entered on any of the three books mentioned are debited and credited, a Journal is kept. Each Journal entry should be dated.

Only four kinds of Journal entries, as indicated below, are occasionally found necessary:

September 30, 1907.

1. Superintendent's Account with
 Treasurer, Dr..... ..
 To Bill Account.....Cr.
 For uncollectable Accounts Receivable charged off during
 month.

(Give details.)

September 30, 1907.

2. Overpayments by Patients Ac-
 count, Dr..... ..
 To Bill Account.....Cr.
 For accumulated, unclaimed Overpayments by Patients
 for services not rendered and not to be rendered, which Over-
 payments are not liable to be claimed by Patients, and are,
 therefore, transferred to Miscellaneous Hospital Earnings by
 authority of the proper official. (Give details.)

September 30, 1907.

3. General Material account, Dr.. ..
 To Superintendent's Account
 with Treasurer.....Cr.
 Account surplus amount of General Material found by

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inventory to be on hand above that heretofore shown by General Material Account.

September 30, 1907.

4. Superintendent's Account with	
Treasurer, Dr..... ..	..
To General Material Ac-	
count.....Cr.	..... ..
Loss or depreciation of General Material as shown by	
inventory.	

When journal entries Number 1 or 2 are made, proper notations should likewise be made on each of the "Pay Patients Card Ledger Accounts" concerned in order to complete such records.

When postings are made from Journal entries to general Ledger Accounts, proper notations should be made on the Journal to show the pages of the Ledger to which each item is posted, and proper reference should be made in each of these Ledger accounts to the page of the Journal from which each posting is made.

Entries to be Made in Opening a New Set of Books

In case the superintendent is about to adopt this system of accounting, and has not already on his books general Ledger accounts such as "Bill Account," "Advance Payments by Patients Account," "Overpayments by Patients Account," "General Material Account," "Voucher Account," and "Superintendent's Account with Treasurer," he may open such accounts by making Journal entries in about the following form, and debiting and crediting his general Ledger accounts accordingly:

September 30, 1907.

Cash Account (Cash Book), Dr.... ..
 To Superintendent's Account
 with Treasurer, Cr.....
 For Cash on Hand September 30, 1907, not including Advance Payments by Patients or Overpayments by Patients.

September 30, 1907.

Cash Account (Cash Book), Dr.....
 To Advance Payments by Patients Account, Cr.....
 Account Advance Payments on hand September 30, 1907.

September 30, 1907.

Cash Account (Cash Book), Dr.....
 To Overpayments by Patients Account, Cr.....
 Account Overpayments on hand September 30, 1907.

September 30, 1907.

Bill Account, Dr.....
 To Superintendent's Account
 with Treasurer, Cr.....
 For Accounts Receivable due September 30, 1907.

September 30, 1907.

General Material Account, Dr.....
 To Superintendent's Account
 with Treasurer, Cr.....
 For General Material on hand September 30, 1907.

September 30, 1907.

Superintendent's Account with
 Treasurer, Dr.....
 To Voucher Account.....Cr.
 For Audited Vouchers Unpaid September 30, 1907.

General Ledger Accounts

The following examples will illustrate the various Ledger accounts it has been found necessary to keep, and the manner in which entries to same are posted. When entries are made to these Ledger accounts, the pages of the books from which they are posted are referred to in each case.

1. CASH ACCOUNT

See Explanations under heading "Cash Book."

2. BILL ACCOUNT

Dr.				Cr.
*Total from previous month....	....	..	Total from previous month....	.... ..
Amount of bills accrued during month (Hospital Earnings), as shown by Bill Register, including monthly earnings of Dispensary, Emergency Ward, and other Miscellaneous Hospital Earnings or bills accrued, including bills for General Material			Cash received during month in payment of bills rendered Patients and including Dispensary, Emergency Ward, and other Miscellaneous receipts account Hospital Earnings and cash received account General Material Sold, as per Cash Book. ....	.... ..

*At the first of each fiscal year, under the headings "Bill Account," "General Material Account," and "Superintendent's Account with Treasurer," the balance shown on the debit side of each account at the end of the previous month should be shown on the debit side only as "Balance at First of Year," instead of "Totals from Previous Months."

Sold during month.....	.... ..	Amounts Due accruing during month or Overpayments by Patients paid by Advance Payments of previous months, as per Bill Register	.... ..
Advance Payments by Patients during month as per Bill Register	.... ..	Accumulated unclaimed Overpayments by Patients transferred to Miscellaneous Hospital Earnings, as per Journal Entry 2.....	.... ..
Overpayments by Patients during month as per Bill Register.....	.... ..	Uncollectable Accounts Receivable charged off during month, as per Journal Entry 1.....	.... ..
Total.....	.... ..	Total.....	.... ..

Difference in totals equals "Accounts Receivable."

3. ADVANCE PAYMENTS BY PATIENTS' ACCOUNT

Dr.				Cr.
Total from previ-		‡Total from previ-		
ous month.....	.... ..	ous month.....	.... ..

‡ At the first of each fiscal year, under headings "Advance Payments by Patients' Account," and "Overpayments by Patients' Account," and "Voucher Account," the balance shown on the credit side of each account at the end of the previous month should be shown on the credit side only, as "Balance at First of Year," instead of "Totals from Previous Months."

Amounts due ac- cruing during month or Over- payments by Pa- tients paid by Advance Pay- ments of previ- ous months, as per Bill Register	Advance Pay- ments by Pa- tients during month, as per Bill Register....
.....
Total..... ..	Total..... ..

Difference in totals equals "Advance Payments by Patients."

4. OVERPAYMENTS BY PATIENTS' ACCOUNT

Dr.					Cr.
Total from previ- ous month.....	.....	..	† Total from previ- ous month.....	.....	..
Overpayments by Patients re- funded to them during month, as per Cash Book.	.....	..	Overpayments by Patients during month, as per Bill Register ...	.....	..
Accumulated un- claimed Over- payments by Pa- tients trans- ferred to Miscel- laneous Hospital Earnings, as per Journal Entry 2.	.....	..	
Total..... ..	.....	..	Total..... ..	.....	..

Difference in totals equals "Overpayments by Patients."

5. GENERAL MATERIAL ACCOUNT

Dr.					Cr.
* Total from previ- ous month...	.....	..	Total from previ- ous month.....	.....	..

† See footnote page 449. * See footnote page 448.

General Material		Cost price of Gen-
Purchased dur-		eral Material
ing month, as		sold during
per Voucher		month, as per
Register.....	.... ..	Bill Register
Surplus amount of		(profit on sales, if
General Material		any, having been
found by inven-		credited to Mis-
tory to be on		cellaneous Hos-
hand, as per		pital Earnings).
Journal Entry 3	.... ..	Loss or Deprecia-
		tion of General
		Material, as
		shown by in-
		ventory, as per
		Journal Entry 4
	
Total.....	.... ..	Total.....
	
Difference in totals equals "General Material on Hand."		

NOTE:—It is customary to charge to General Material Account supplies such as uniform materials, caps, aprons, etc., which are purchased for graduate nurses, to be sold to them later on, as required, at cost plus 10 per cent. to cover cost of storing, handling, etc. The cost of these supplies is, therefore, not a part of operating expenses.

As these supplies are sold, General Material Account is credited with the cost price of same, and profit is credited to Miscellaneous Hospital Earnings. This does not include such supplies as are given to nurses without charge, which are charged direct to the account "Equipment for Nurses" schedule of expenses.

6. VOUCHER ACCOUNT

Dr.		Cr.
Total from previ-	‡ Total from pre-	
ous month....	vius month....

‡ See footnote page 449.

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Vouchers paid during month, as per Cash Book.....	Amount of vouchers registered during month, as per Voucher Register.....
Total.....	.... ..	Total.....	.... ..
Difference in totals equals "Audited Vouchers Unpaid."			

7 SUPERINTENDENT'S ACCOUNT WITH TREASURER

Dr.			Cr.
*Total from previous month...	.... ..	Total from previous month.....	.... ..
Grand Total Current Expenses, during month, as per Voucher Register.....	.... ..	Amount of bills accrued (Hospital Earnings) as shown by Bill Register, including monthly earnings of Dispensary, Emergency Ward and Other Miscellaneous Hospital Earnings or bills accrued during month.....	.... ..
Capital Expenditures during month, as per Voucher Register.....	.... ..	Cash received during month from Treasurer, as per Cash Book.....	.... ..
Cash received in payment of bills rendered Patients and including Dispensary, Emergency Ward and Other Miscellaneous Receipts account Hospital Earnings and cash received account General Material Sold, and remitted to Treasurer during		Surplus Amount of General Material found to be on hand, as per Journal Entry 3 ....	..

* See footnote page 448.

month, as per Cash Book..... ..	..
Uncollectable Ac- counts Receiv- able charged off during month, as per Journal En- try 1..... ..	..
Lossor Depreciation of General Mater- ial charged off during month as per Journal En- try 4..... ..	..
Total..... ..	..
Total..... ..	..

Difference in totals equals balance shown by "Superintendent's Account with Treasurer" and must agree with balance shown in "Treasurer's Account with Superintendent" on the Treasurer's General Ledger.

The Trial Balance

Between the sixth and eighth of each month, after all entries for the previous month to each Ledger account have been made, totals footed, and balance of each account determined, the superintendent makes his trial balance in the following form, by adding the debit and credit balance of these accounts, the totals of which must agree if all entries have been properly made:

Cash in hands of Superintendent..... ..	..
Accounts Receivable..... ..	..
General Material on Hand..... ..	..
Balance shown by Superintendent's Account with Treasurer.....
Advance Payments by Patients for services to be rendered.....

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Overpayments by Patients for services not rendered and not to be rendered.....
Audited Vouchers Unpaid.....	.....	..
	<hr/>	<hr/>
Totals (which should agree).....	..	..... ..

TRANSACTIONS BETWEEN SUPERINTENDENT AND TREASURER

Cash Remittances by Treasurer to Superintendent

About the end of each month the superintendent makes a careful estimate of the monthly pay-roll and requests the proper committee or authority for that amount, which, if approved by that body or person, is then remitted by the treasurer to the superintendent, so that the superintendent may deposit the check and draw the necessary cash with which to pay the pay-roll. As soon as the pay-roll is finally completed, the actual amount is then entered on the Voucher Register under the proper headings.

About the sixth of each month, or as soon as the superintendent has received all the bills for the previous month, approved, vouchered, and entered them under the proper headings, and made the necessary footings, he makes a report to the proper committee or authority, and requests a check for the combined amount of "Grand Total Current Expenses," "Total Capital Expenditures," and "General Material Purchased" during the previous month, less the amount which he has already received from the treasurer on account of the estimated pay-roll referred to above. If this request is likewise approved by that

body or person, the treasurer remits to the superintendent a check for the net amount. The superintendent then deposits the check and immediately mails individual vouchers or ordinary checks to the various creditors.

Cash Remittances by Superintendent to Treasurer

About the sixth of each month, or oftener if desired, the superintendent remits to the treasurer a check for cash received during previous month, as per Cash Book, in payment of bills against patients and including dispensary, emergency ward, and other miscellaneous receipts account hospital earnings, or for general material sold during previous month.

Monthly Report of Superintendent to Treasurer

Between the sixth and eighth of each month the superintendent sends to the treasurer a report as shown in Exhibit G which is a detailed statement of the "Superintendent's Account with Treasurer."

The balance, as shown by this account, if correct must agree with the balance of the corresponding Ledger account on the books of the treasurer, entitled "Treasurer's Account with Superintendent." This report of the superintendent also includes a copy of his trial balance.

Statistics

The preceding pages thoroughly canvass the various expenses incurred in the management of a hospital and the revenue obtained from various sources, and

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show plainly how to account for each item. There now remains one more matter to consider—the statement of work accomplished by the hospital.

Few hospital superintendents figure correctly the number of “Patient Days Treatment” given during any month or year. The number of individual patients treated is an easy figure to arrive at, but when it comes to figuring the days treatment, due to a misapprehension on the part of the superintendent, the hospital does not get the full benefit of the work accomplished in the wards or private rooms.

Many hospital superintendents make the error of taking the number of patients in the wards or private rooms at the beginning of any day, adding the number of patients admitted to the wards or private rooms during the day, and subtracting the number of patients discharged from the wards or private rooms during the day, and then show the net figures as the total “Patient Days Treatment” for that day.

It will be noted that, by this method, should there be more patients discharged than admitted during the day, the figure shown as “Total Patient Days Treatment” for that day would be less than the figure shown as “Patients Remaining at the Beginning of the Day.”

Now note the right way:

The number of patients remaining in the wards or private rooms at the beginning of any day, plus the number of patients admitted to the wards or private rooms during the day, should be considered the total “Patient Days Treatment” for that day.

The number of patients discharged from the wards or private rooms during that day should only be

deducted from the total "Patient Days Treatment for that day, when showing the number of patients remaining in the wards or private rooms at the beginning of the following day.

To get at the number of "Free Ward Days Treatment" and "Pay Ward Days Treatment" during the month, it is customary to divide the figure shown as the hospital earnings from "Ward Pay Patients" on the schedule of Current Revenue, by the amount charged per day for treatment in the wards. For instance, if the hospital earnings from "Ward Pay Patients" during the month amounted to \$750.00, and the hospital charge for patients admitted to the wards should be \$1.50 per day, by dividing \$750.00 by \$1.50 we would get 500 days of "Pay Ward Days Treatment," and by subtracting the 500 days from the total figures shown as "Ward Days Treatment" we would have the number of "Free Ward Days Treatment." If the hospital desires to report "Endowed Bed Days Treatment," it will only mean subtracting another figure from the total "Ward Patient Days Treatment."

In accounting for the work accomplished in the services of the hospital, other than the wards or private rooms proper, such as the "Dispensary," or "Emergency Ward," etc., the term "Visits" takes the place of "Patient Days Treatment," as the patients do not remain in the hospital.

The following statement will afford a complete knowledge of the work in the various departments for the treatment of patients connected with the hospital. The forms on pages 426-432 illustrate how daily statistics may be recorded for the detailed monthly statement.

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HOSPITAL WARDS AND PRIVATE ROOMS

Patients in Hospital First of Month:

In Medical Wards, Male.....	
Female.....	....	....
In Surgical Wards, Male.....	....
Female.....	....	....
In Private Rooms, Male.....	....
Female.....	....	....
Total.....		....

Patients Admitted During Month:

To Medical Wards, Male.....	....
Female.....	....	....
To Surgical Wards, Male.....	....
Female.....	....	....
To Private Rooms, Male.....	....
Female... ..	....	....
Total.....	....	....

Total Patients Treated in Hospital Wards and Private Rooms During Month:

Male.....	....
Female.....	....	....

Patients Discharged During Month:

Cured.....	....
Improved.....	....
Unimproved.....	....
Transferred to other Institutions.....	....
Died.....	....
Total.....	....	....

Patients in Hospital End of Month:

In Medical Wards, Male.....	....
Female.....	....	....
In Surgical Wards, Male.....	....
Female.....	....	....
In Private Rooms, Male.....	....
Female.....	....	....
Total.....		....

Total Patient Days Treatment:

Free Ward.....	....
Endowed Bed.....	....
Pay Ward.....	....
Private Room.....	....
Total.....	....

Percentage:

Free Ward Days.....	....
Endowed Bed Days.....	....
Pay Ward Days.....	....
Private Room Days.....	....

Average Patients per Day:

Free Ward.....	....
Endowed Bed.....	....
Pay Ward.....	....
Private Room.....	....
Total.....	....

Average Time Patient in Hospital.....	....
Daily Average Cost per Private Room Patient.....	....
Daily Average Cost per Ward Patient.....	....

EMERGENCY WARD

Patients under Treatment First of Month, Male	....
Female	....	....
Patients Admitted During Month.....Male..	....
Female	....	....
Total Patients Treated During Month....Male	....
Female	....	....
Patients Discharged During Month.....Male	....
Female	....	....
Patients under Treatment End of Month Male	....
Female	....	....
Visits Made to Emergency Ward During Month	....
Average Visits Made per Day .....	....
Average Visits per Patient.....	
Daily Average Cost per Emergency Ward Pa- tient.....

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DISPENSARY

*Patients under Treatment First of Month, Male	
Female
Patients Admitted During Month.....	Male
Female	.....	.....
Total Patients Treated During Month. ...	Male	.....
Female	.....	.....
*Patients Discharged During Month.....	Male	.....
Female	.....	.....
Patients under Treatment End of Month	Male	.....
Female	.....	.....
Visits Made to Dispensary During Month		.....
Average Visits per Day .....		.....
Average Visits per Patient.....		.....
Daily Average Cost per Dispensary Patient....		.....

AMBULANCE

Ambulance Calls During Month.....	.....
Average Calls per Day.....	.....
Patients Treated by Ambulance Surgeon in Emergency Ward and Transferred.....	.....
Patients Treated by Ambulance Surgeon and Left at Place of Call or Transferred Direct to Other Institutions or to their Homes	.....

VISITING OR HOME (DISTRICT) NURSING

No. of Patients Visited.....	.....
No. of Visits Made.....	.....
Average Visits per Day.....	.....
Average Cost per Visit.....	.....

SUMMARY

Total Patients Treated During Month in all De- partments.....	.....
Average Patients per Day in all Departments.	.....
Daily Average number of Employees Boarded in Hospital.....	.....
Daily Cost per Capita for Provisions for all per- sons supported.....	.....

* If on account of the nature of the service in the dispensary it is impracticable to determine accurately the number of

If the preceding detailed statement of statistics is prepared monthly, it will be a simple matter at the end of twelve months to add together the twelve monthly totals of each item and thus have a complete yearly report ready for publication.

patients under treatment at first or end of month or the number of patients discharged during any month, estimated figures should be shown.

REPORT OF SUPERINTENDENT TO TREASURER FOR MONTH OF

19 .

Dr.				Cr.			
Total from previous month.....				Total from previous month.....			
Operating and Corporation Expenses during month.....				Hospital Earnings (Schedule 2) during month, as per Bill Register.....			
Current Expenses from Special Funds during month. (Show expenditures from each Fund separately).....				Cash received from Treasurer during month, as per Cash Book.....			
				Surplus Amount of General Material found to be on hand, as per Journal Entry 3.....			
				Balance as shown by "Superintendent's Account with Treasurer".....			
Grand Total Current Expenses (Schedule 1) during month, as per Voucher Register.....				*Grand Total.....			
Capital Expenditures(Schedule 3) during month (Show expenditures for each account separately)							
Total Capital Expenditures (Schedule 3) during month, as per Voucher Register.....				TRIAL BALANCE AT END OF MONTH			
Cash Received, account Hospital Earnings and General Material sold and remitted to Treasurer during month, as per Cash Book.....				Dr.		Cr.	
Loss or Depreciation of General Material charged off as per Journal Entry 4.....				Cash on hand.....			
Uncollectable Accounts Receivable charged off as per Journal Entry 1.....				Accounts Receivable.....			
				General Material on hand.....			
				Balance as shown by Superintendent's Account with Treasurer.....			
				Advance Payments by Patients.....			
				Overpayments by Patients.....			
				Audited Vouchers Unpaid.....			
*Grand Total.....				Totals, which must agree.....			

*Grand Totals must agree.

Statistics for Month of *October* 1909

HOSPITAL WARDS AND PRIVATE ROOMS

ADMITTED

DISCHARGED

PATIENT DAYS TREATMENT

	Medical Wards			Surgical Wards			Private Rooms			General Ward				Endowed Bed			Private Room			Grand			
Day of Month	M	F	M	F	M	F	Total	Cured	Imp	Us.amp	Transf.	Died	Total	Remain.	Adm.	Total	Remain.	Adm	Total	Remain.	Adm	Total	Total
REMAINING	47	45	34	49	7	10	192						156		19		17					192	
1	4	-	4	-	-	1	9	4	4	1	-	1	10	156	6	162	19	2	21	17	1	18	201
2	-	-	3	3	-	-	6	12	2	-	-	1	15	154	6	160	20	-	20	17	-	17	197
3	-	-	2	2	-	-	4	8	3	1	-	3	15	148	1	149	17	3	20	17	-	17	186
4	3	3	3	4	-	-	13	4	1	-	-	-	5	137	7	144	18	6	24	16	-	16	184
5	5	2	4	3	-	1	15	5	2	1	-	4	12	144	13	157	22	1	23	13	1	14	194
6	5	2	3	5	1	1	17	5	2	-	-	-	7	146	12	158	22	3	25	14	2	16	199
7	4	2	3	3	-	1	13	5	3	-	-	-	8	154	11	165	24	1	25	14	1	15	205
8	3	2	1	4	1	1	12	6	3	2	-	-	11	158	8	166	24	2	26	15	2	17	209
9	4	1	9	3	-	2	19	10	4	-	-	2	16	158	15	173	24	2	26	16	2	18	217
10	-	-	3	2	-	1	6	3	-	2	-	1	6	160	3	163	24	2	26	17	1	18	207
11	3	6	4	2	-	1	16	6	1	3	1	1	12	158	13	171	25	2	27	18	1	19	217
12	3	1	3	1	-	-	8	5	3	4	-	-	12	162	7	169	25	1	26	18	-	18	213
13	4	3	3	6	-	-	16	5	4	3	-	2	14	159	15	174	24	1	25	18	-	18	217
14	5	-	4	-	-	1	10	8	5	1	-	2	16	161	9	170	24	-	24	18	1	19	213
15	2	2	3	3	-	-	10	4	3	1	-	2	10	155	8	163	23	2	25	19	-	19	207
16	2	-	1	4	-	-	7	6	6	-	-	1	13	155	7	162	23	-	23	19	-	19	204
17	1	2	1	2	-	2	8	8	2	-	-	1	11	152	6	158	22	-	22	17	2	19	199
18	5	1	1	5	1	-	13	6	3	1	1	1	12	148	11	159	22	1	23	18	1	19	201
19	2	2	3	1	-	-	8	4	6	1	1	-	12	149	7	156	22	1	23	18	-	18	197
20	3	-	4	4	-	2	13	5	5	-	-	-	10	147	9	156	22	2	24	16	2	18	198
21	4	2	1	3	-	2	12	4	-	1	1	-	6	148	9	157	22	1	23	18	2	20	200
22	-	4	5	2	1	-	12	6	2	1	-	-	9	152	11	163	23	-	23	19	1	20	206
23	2	-	1	2	-	1	6	6	2	-	1	1	10	155	5	160	23	-	23	19	1	20	203
24	2	1	1	4	-	1	9	10	2	-	-	-	12	152	7	159	21	1	22	20	1	21	202
25	2	3	6	4	-	-	15	8	-	1	1	-	10	148	15	163	22	-	22	20	-	20	205
26	1	1	4	2	-	-	8	4	7	-	1	2	14	155	8	163	21	-	21	19	-	19	203
27	2	2	4	2	1	1	12	5	4	1	-	-	10	150	4	154	20	6	26	19	2	21	201
28	2	2	3	6	-	-	13	5	1	2	-	2	10	150	13	163	21	-	21	20	-	20	204
29	-	4	2	4	1	-	11	7	2	1	-	-	10	156	9	165	19	1	20	19	1	20	205
30	3	1	2	-	1	1	8	5	3	2	-	3	13	156	6	162	20	-	20	19	2	21	203
31	2	2	2	3	-	-	9	9	1	-	-	1	11	150	8	158	20	1	21	20	-	20	199
Total Patients admitted during month	78	51	93	89	7	20	338						269		42		27						

Other Totals 188 86 30 7 31 342 4733 5002 678 720 547 574 6296

Statistics for Month of *October* 1909

EMERGENCY WARD

DISPENSARY

AMBULANCE

VISITING NURSING

ADMITTED	DISCHARGED	Visits	ADMITTED			DISCHARGED	Visits	Calls	Transf. from Emergency Ward	Left at place of call or transf. direct	No. of Patients	No. of Visits
			M.	F.	Total							
136	102	238	86	9	95	87	77	174	6	-	3	198
19	6	25	14	5	19	64	54	49	103	30	1	35
17	6	23	12	7	19	67	37	25	62	192	9	36
10	4	14	10	2	12	31	-	-	-	-	6	6
19	10	29	15	6	21	76	55	61	116	Dispensary it is	320	3
22	6	28	17	3	20	62	39	44	83	impracticable to	234	1
17	8	25	8	4	12	60	43	38	81	determine accurate-	306	3
17	9	26	12	6	18	66	44	43	87	by the number of	186	30
20	10	30	21	7	28	85	44	45	89	patients under treat-	334	32
25	6	31	21	5	26	74	34	48	82	ment at first of	228	34
6	6	12	49	24	73	24	-	-	-	month, or the num-	7	8
24	12	36	22	7	29	82	42	67	109	ber of patients dis-	337	31
19	7	26	14	6	20	64	-	-	-	charged during the	11	28
10	6	16	11	3	14	62	51	42	93	month, estimated	327	32
18	5	23	15	4	19	62	34	52	86	figures should	248	36
19	3	22	11	2	13	51	30	29	59	be shown.	306	32
14	7	21	14	4	18	56	19	32	51		204	21
15	4	19	8	3	11	35	-	-	-		11	4
8	4	12	7	7	14	41	42	34	76		272	33
15	13	28	11	6	17	66	34	48	82		208	23
18	3	21	15	2	17	62	39	40	79		294	23
16	12	28	12	7	19	57	28	43	71		210	37
18	4	22	12	3	15	49	28	34	62		282	33
16	7	23	10	2	12	53	34	43	77		222	40
10	3	13	51	27	78	26	-	-	-		-	4
15	9	24	11	10	21	61	41	36	77		315	36
25	6	31	14	6	20	48	40	43	83		227	31
15	4	19	18	2	20	60	35	43	78		310	35
14	5	19	12	3	15	50	35	46	81		215	24
20	10	30	16	9	25	50	25	34	59		292	35
21	8	29	13	3	16	72	39	30	69		263	28
13	6	19	8	2	10	40	-	-	-		12	6
515	209	724	946	104	1995							78

484 187 671 1756 944 1044 1988 6633 287 14 120 843

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